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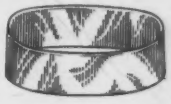

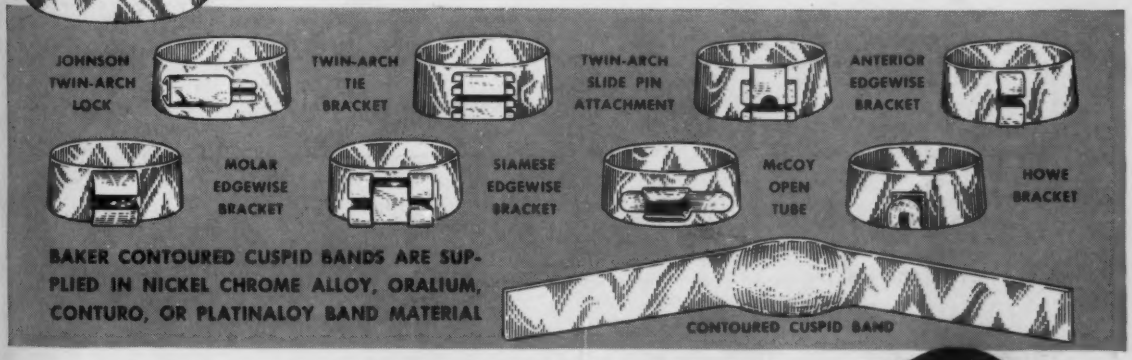

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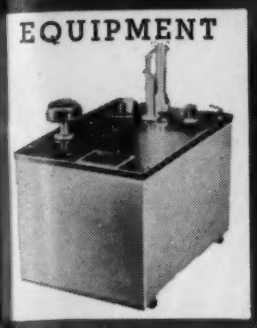

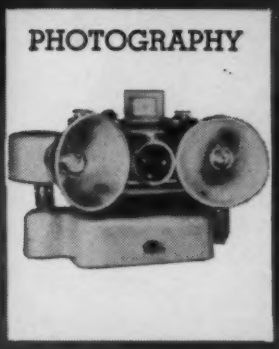

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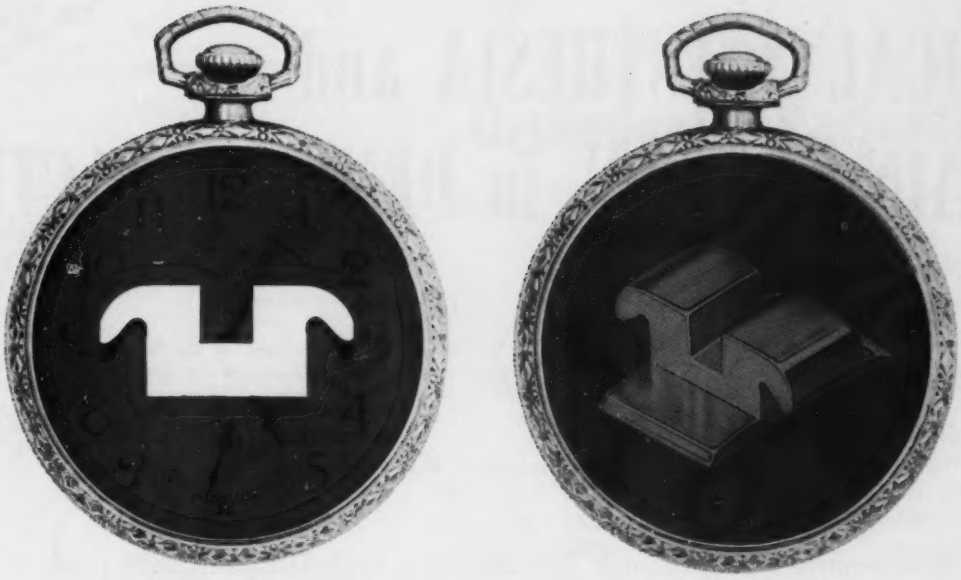

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American Journal

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ORTHODONTICS

VOL. 43 JUNE, 1957 NO. 6

Original Articles

THE ALAMEDA INSTRUMENTALIST STUDY*

JOHN H. PARKER, D.D.S., ALAMEDA, CALIF.

SINCE the advent of cephalometry in 1931, many new avenues of investigation have been opened into the growth and development of the face. Not only has the cephalometer proved its worth in the study of growth of the skull; it has also shown the correlation of the soft tissue with that of the photograph in which we are vitally interested. A static analysis, such as we find made by Downs, Björk, Wylie, Steiner, Margolis, Tweed, and many others, is one form of investigation that has proved its worth, but there are still other forms of exploration within the field of cephalometry. One of these is a functional analysis.

Little is known of the influence of the forces on bone of the complex structures known as function, but this interrelationship of musculature with the position of the teeth is often discussed in literature. Orthodontists recognize that the harmonious balance of the musculature and its environment is a prime requisite toward maintaining the desired equilibrium of the position of the teeth. Any interruption of the balance of the teeth by habit or adverse pressures becomes exceedingly important to the orthodontist in his treatment or planning. One of the interesting pressures or habits that must be considered is the influence of the musical instrument. With the ever-increasing importance of instrumental music as a mode of self-expression, we find that many children are turning toward this as a secondary avocation.

*This article placed third in the 1956 Annual Prize Essay Contest of the American Association of Orthodontists.

Within the last decade musical instruments have become increasingly popular and school systems are making them a larger portion of their budgetary items, with more emphasis being placed on instrumental music than ever before. Longer hours of practice are necessary if the youngster is to find his or her place in the school orchestra.

As yet, there is little or no literature that discloses in a complete form the picture of pressures that might be expected from any of the musical instruments. We have received impressions from prior writings[1] that certain musical instruments of one type (trumpet or horn) will produce a favorable direction of tooth positioning, while other musical instruments of another type (clarinet) will create a disagreeable tooth angle in relation to the bone and developing structures. In order to investigate these claims more thoroughly, we turn to the cephalometer, which is able to disclose the position of the teeth in relation to the bony structures and compare one group of instrumentalists with another. It can also give a clear picture of the relationship of the soft tissue in compression from these instruments. Strayer,[1] in 1939, pointed out the value of the clarinet in Class III cases and stated that this instrument should not be used in Class I cases with protruding upper anterior teeth or in any Class II, Division 1 cases and, because of the anterior restraining force acting on the mandible, it should not be used in Class II, Division 2 cases.

The purpose of this article is to offer a scientific approach to the often discussed problem of the influence of musical instruments as related to tooth positioning, using the latest developments in cephalometric x-ray technique. It is also hoped that this article, with supplemental interpretation, will serve as a teaching guide for music instructors who will be able to recognize malocclusion and assist in directing children in the selection of an instrument that will be of greatest benefit to them from an orthodontic viewpoint. It may also present conclusions that will stimulate individual thinking by the orthodontist and researcher.

An investigation of the literature shows that there is a meager amount of scientific material available to guide the orthodontist or music instructor and that certain objections to the reed instrument are made on a purely mechanical basis. There are even controversies between orthodontists as to the merits of one instrument over another. It is in the interest of the public that this investigation was made.

In order to proceed, it was necessary to enlist the aid of a school department large enough to make available a group of proficient students of instrumental music who had at least two years of instruction. *Length of instruction time and proficiency were the only two requisites.* The city chosen for this investigation has a population of 67,000, with two high schools and thirteen grade schools, each of which has a complete music department. Eighty-four students of all ages and both sexes were roentgenographed in the cephalometric head holder in closed position, in rest position, and actually playing a note on their individual instruments.

Fig. 1 illustrates clarinetists in the head holder. Additional instrumentalists chosen were trumpet, trombone, flute (Fig. 2, *C*),* and saxophone players.

The x-ray unit used was a Profex 100 k.v. unit with a Philips rotating anode and an 0.3 mm. aperture. Projections were made through an 18 inch cone at the end of which was placed a plastic disk with a barium masking to

Fig. 1.

permit the soft tissue to be underexposed in comparison with the hard tissue in the center of the headfilm. A Bucky grid and a screen grid were also used in order to define more sharply the outline of the structures. Additional studies of the trumpet were made by using a plastic mouthpiece to disclose the exact outline of the lips within the cuplike mouthpiece.

*In Figs. 2, 4, and 5, the dotted lines represent closed position of teeth and lips; the solid lines show positions when the instrument is being played.

For purposes of classification, musical instruments of the brass and woodwind types are divided into four groups. Porter,[2] in 1952, classified the various instruments as follows:

Class A. All members of the brass family having a cup-shaped mouthpiece.

1. Trumpet
2. Horn (French)
3. Horn (German)
4. Alto horn
5. Trombone
6. Baritone
7. Euphonium (tenor tuba)
8. Tuba

Class B. All instruments of the woodwind group having a hole in the head of the instrument across which air is blown.

1. Piccolo
2. Flute

Class C. All instruments having a single reed "ligatured" to the mouthpiece.

1. "E flat" clarinet
2. "B flat" clarinet
3. "A" clarinet
4. Alto clarinet
5. Bass clarinet
6. "B flat" soprano
7. "B flat" soprano saxophone
8. "B flat" tenor saxophone
9. "E flat" baritone saxophone
10. Bass saxophone

Class D. All instruments having a double reed as mouthpiece.

1. Oboe
2. Oboe d' amore
3. Cor anglais
4. Heckelphone
5. Bassoon
6. Contra-bassoon

Porter states further: "Although constructed mainly of metal, the saxophone is considered wood-wind, since the sound is produced by the vibration of the reed which is usually of wood.

"The method of blowing the instrument is known as embouchure and refers to the manner or method of applying lips to the mouthpiece of an instrument." Porter explains: "The word is French in origin and literally means 'opening into,' and the German interpretation 'Ansatz' is 'setting on.' Musically, embouchure is the mode of applying the lips to the wind instrument. From a dental point of view it might be defined as the method of applying the lips and mouth to the mouthpiece of a musical wind instrument as expertly advised, or the method actually adopted or developed by a particular player for the particular mouthpiece of a wind instrument."

The muscles participating in the embouchure for all brass and woodwind instruments are the: (1) orbicularis oris, (2) caninus, (3) triangularis, (4) quadratus labii superioris, (5) quadratus labii inferioris, (6) zygomaticus, (7) risorius, (8) mentalis, (9) buccinator, (10) masseter, (11) platysma, and (12) supra- and infrahyoids.

Additional muscles used in the thrust action by many trumpet players are: (1) the pterygoideus externus and (2) the pterygoideus internus.

In Class A, the placement of the mouthpiece of the trumpet (small cup-like), as shown in Fig. 2, *A*, is almost directly in front of the opening of the lips with the instrument pressed against the upper and lower lips. The large

horn mouthpiece (trombone) shown in Fig. 2, *B*, is placed higher, with the upper two-thirds of the mouthpiece above the lip opening and the remaining third of the mouthpiece below.

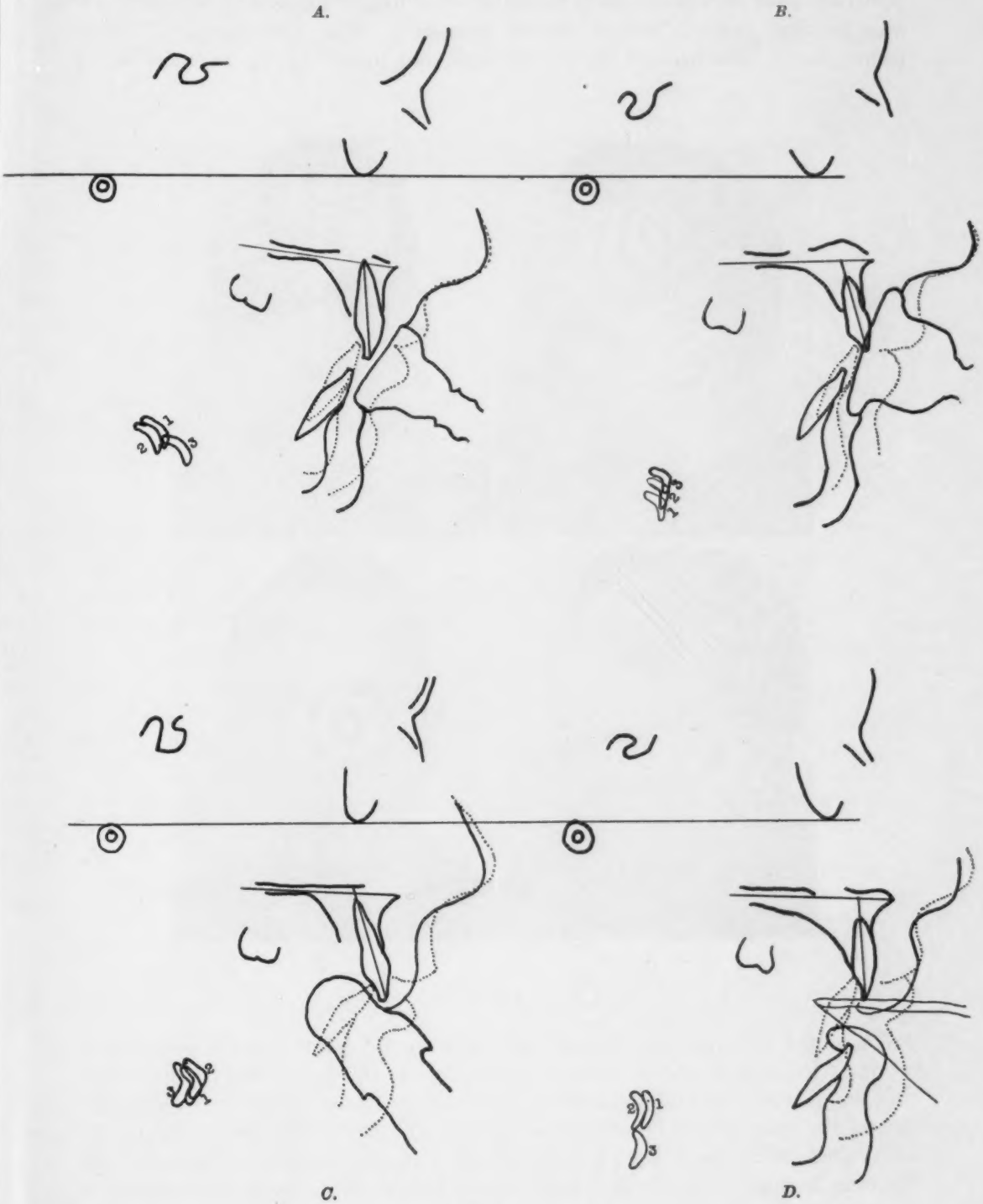


Fig. 2.

In Class C (Fig. 2, *D*), the lower lip acts as a cushion for the tip of the instrument on which the lower portion of the mouthpiece rests. (The lower border in musical terminology is known as the "lay.")

The word "embouchure" becomes exceedingly important in the "C" classifications studied in this article, because it is in this group of instruments that a misconceived theory of "bite and blow" by the amateur is not

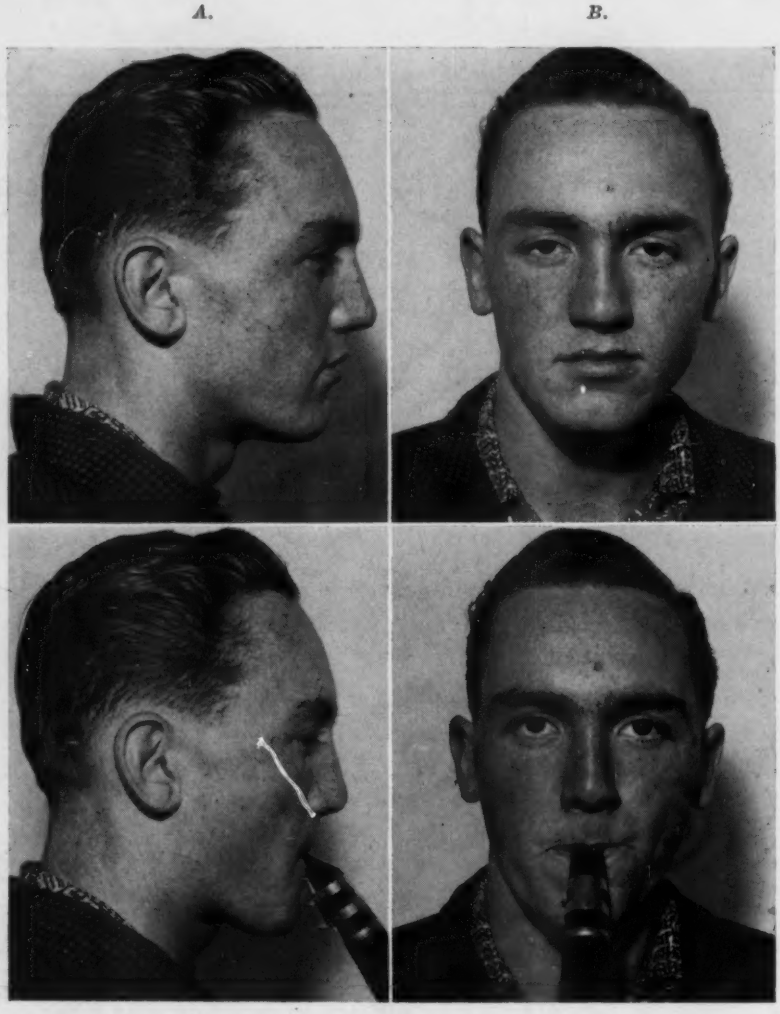


Fig. 3.

the accepted embouchure. Rather, this word should refer to the correct placement of the lips in which there is contraction of the muscle fibers (Fig. 3, *C* and *D*), causing the face to assume a tenseness or strong muscular tonicity that draws the nose down, flattening or bulging the upper lip, according to the individual, while the lower lip folds inward over the mandibular incisors, thus forming a small hole through which air is blown for Class B instruments or forming the entrance for the insertion of the mouthpiece in Class C instruments.

In Class C there are some interesting comparisons, not only of lip position but of angulations of the same instrument (Fig. 4, *A*, *B* and *C;* clarinets).

The upper lip is normally drawn down with the maxillary teeth resting on top of the clarinet mouthpiece, but a difference is shown in Fig. 4, *B* (clarinet)

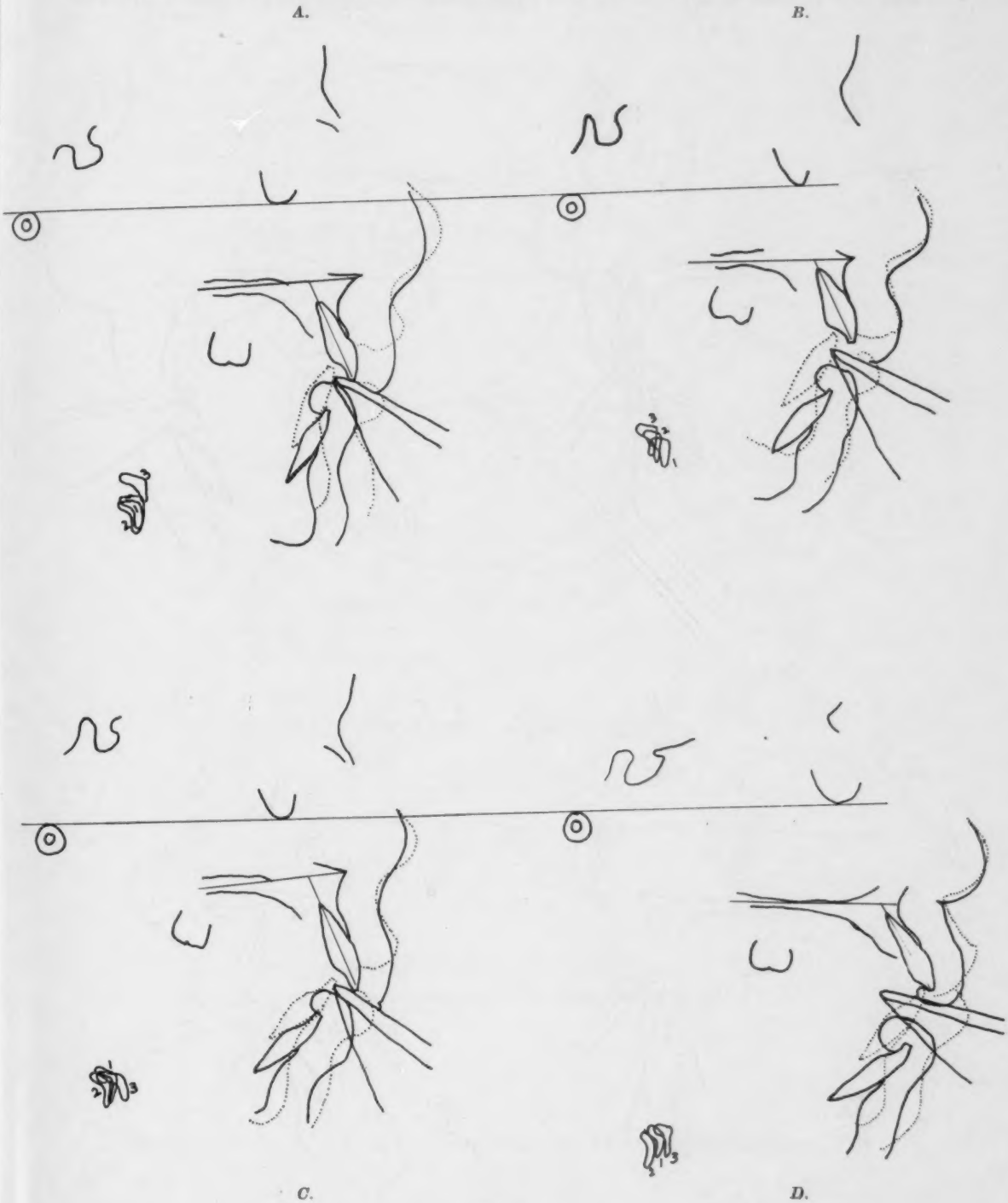


Fig. 4.

and Fig. 4, *D* (saxophone), in which the lip is curled over the incisors above and below. This indicates the passive pressure (desirable method) of the teeth in the embouchure because it is inconceivable that a player is going to bite through his own lips. A study of the headfilms of the clarinet players shows that the volume of air coming from the throat is apparently directed upward

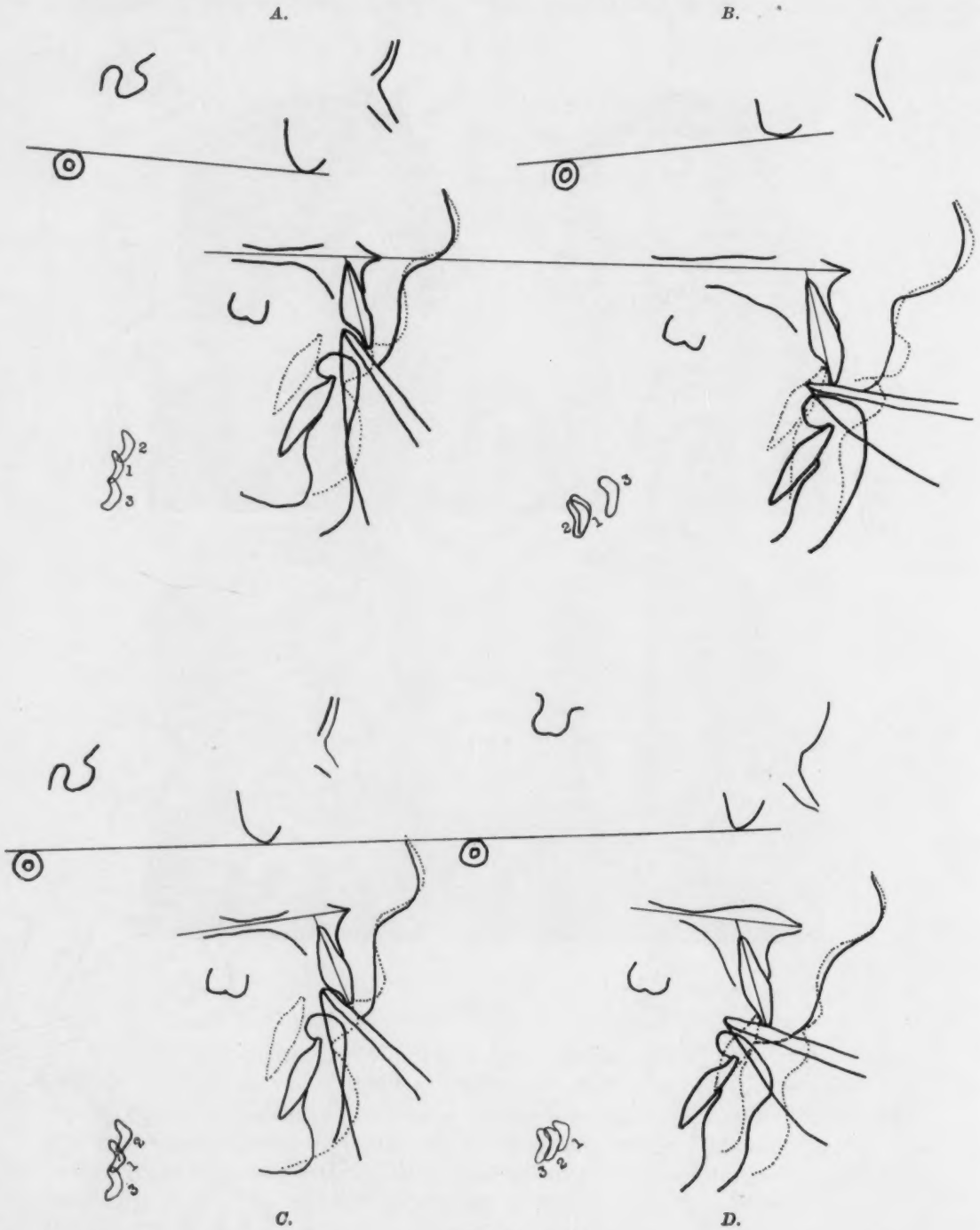
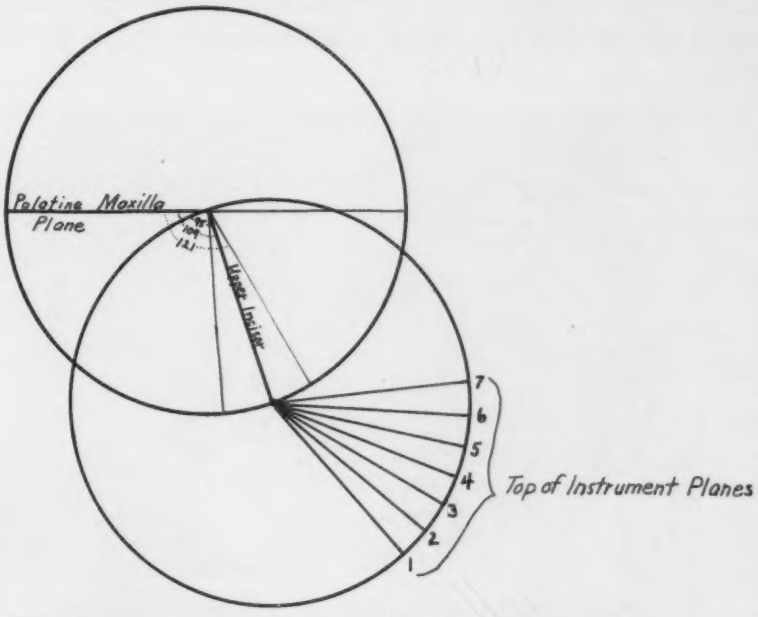


Fig. 5.

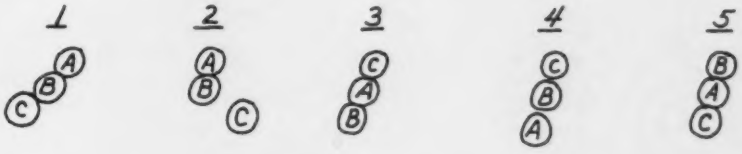
from the pharynx toward the palatine and maxillary bones in a curved passage, with the tongue acting as the floor of the passage. The uvula is raised to assist in preventing escape of the air into the nasal portion of the pharynx, thus removing any tissue obstruction to the even flow of the air. It is possible that a new concept of clarinet positioning will be the result of this early survey

A.



Relationship of Palatine Maxilla Plane With
1.- Upper Incisors
2.- Top of Instrument

Positions of Hyoid Bone



A = Closed position of mandible in headfilm
B = Rest position of mandible in headfilm
C = While playing instrument

(Positions A-B in 1-2-3 are considered normal - Thompson J.R.)

B.

Fig. 6.

because the palates of these players varied in form from flat, low palates to high palates to angulated palates, with no external physical characteristics giving any clue as to the type of palate for the individual person (Fig. 5, *A*, *B*, *C*, and *D*).

The variations in the flow of air from the throat into the reed of the mouthpiece may be likened to an airplane flying into a crosswind; in order to obtain maximum efficiency, it must be trimmed with perfect angulation. Therefore, a youngster may tend to raise or lower an instrument to suit his or her individual need.

A further study of a number of mandibular abstraction cases, particularly the Class II, Division 1 cases, indicates that the instrument cannot be held at a very high angle, as a seal formed by the lower lip is well behind the position of the upper lip and there is apparently no thrust action discernible in the mandible.

TABLE I. TRUMPET

INITIALS OF SUBJECT	SEX	AGE	RACE	CLASSIFICATION (ANGLE)	YEARS PLAYED	MAXILLARY-INCISOR ANGLE (DEGREES)	POSITION OF HYOID	COMMENTS
G. A.	M	14½	White	Class I	5	118	2	Good occlusion
P. A.	M	17	White	Class I	7	109	2	Excellent occlusion
L. A.	M	14	White	Class II, Div. 1, Sub.	2	108	2	
D. B.	M	17	White	Class I	8	115	2	Excellent occlusion
K. B.	M	11	White	Class I	2	107	1	
B. B.	M	16	White	Class I	4	106	1	Excellent occlusion
R. B.	M	13	White	Class I	2½	109	2	
B. C.	M	13	White	Class I	3	110	1	
S. C.	M	15	White	Class I	6	105	4	
D. C.	M	16	Negro	Class I, DP	2	118	3	
T. C.	M	14	White	Class I	2½	114	3	Good occlusion
T. C.	M	13	White	Class I	2½	111	1	
G. F.	M	16	White	Class II, Div. 1	7	109	2	
R. G.	M	13	White	Class II, Div. 1, Sub.	3½	103	1	
B. H.	M	15	White	Class I	5	103	2	Excellent occlusion
E. H.	M	13	White	Class I	3	108	2	
J. J.	M	11	White	Class I	3	111	1	Excellent occlusion
E. L.	M	16	White	Class I	3	117	2	
M. M.	M	10	White	Class I	2½	107	5	Excellent occlusion
A. N.	M	14	White	Class I	3	101	2	Good occlusion
T. N.	M	13	White	Class I	3	113	3	
J. R.	M	17	White	Class I	5½	109	3	
D. S.	M	13	White	Class I	7	102	1	
D. S.	M	10	White	Class I	2½	106	2	
M. S.	M	15	White	Class I	2	111	3	Good occlusion
W. T.	F	16	White	Class I	4	115	2	
J. W.	F	15½	White	Class II, Div. 1, Sub.	3	107	2	
R. W.	F	15½	White	Class II, Div. 1, Sub.	2	101	2	Crowded upper and lower anterior teeth
R. W.	M	11	White	Class I	2	104	4	
D. W.	M	11	White	Class I	3	113	1	

Average angle = 109°

The relative angulation formed by the clarinet and saxophone mouthpieces to the maxillary palatine plane and to the average maxillary incisor plane is shown in Fig. 6, *A*. These have been graded in numbers from 1 to 7.

A further study of all children surveyed was made of the hyoid bone* in: (1) closed position, (2) rest position, and (3) functioning position (Fig. 6, *B*).

Of particular importance was the angulation of the maxillary central incisors to the basal bone and the comparison of the average of the total angulations found between the favored trumpet (Table I) or horn and the unpopular

Fig. 7.

clarinet (Table II) from an orthodontic viewpoint. Records of the flute and saxophone players (Table III) are shown but are not considered experimentally adequate. They are included in the hope that a clue may be offered to the value of these instruments. Photographs of all the students who played the

*Perhaps this bone will become the key link in much of the functional analysis, particularly in closed and rest position of closed-bite cases. (Conversation with John R. Thompson.)

TABLE II. CLARINET

INITIALS OF SUBJECT	SEX	AGE	RACE	CLASSIFICATION (ANGLE)	YEARS PLAYED	MAXILLARY-INCISOR ANGLE (DEGREES)	INSTRUMENT PLANE (FIG. 6, *A*)	POSITION OF HYOID	COMMENTS
V. A.	M	12	White	Class II, Div. 1	3	117	2	1	Extreme Class II
B. A.	M	13	White	Class II, Div. 1	2	112	3	1	
L. B.	F	12	White	Class II, Div. 1	3	107	5	3	
B. B.	F	13	White	Class II, Div. 1	3	101	3	5	
D. B.	M	16	White	Class I, D. P.	7	108	4	3	
K. B.	M	17	White	Class I	7	102	3	3	Excellent occlusion
R. C.	M	9	White	Class I	2	106	2	2	
R. D.	F	11	White	Class II, D. P.	2	107	2	3	
S. G.	M	11	White	Class I	3	108	3	2	
B. H.	M	9	White	Class I	2	115	3	4	
D. H.	M	12	White	Class I	3	115	3	5	
B. H.	M	14	White	Class I	3	112	5	1	Good occlusion
M. K.	M	14	White	Class I	5	109	4	3	
W. K.	M	13	White	Class I	2½	109	3	5	
J. L.	F	16	White	Class I	5	117	3	2	Excellent occlusion
C. M.	F	13	White	Class I	3	103	3	4	
M. M.	M	12	White	Class I, D. P.	3	108	2	5	
R. M.	M	12	Japanese	Class I	2	111	3	5	
J. M.	M	13	White	Class II, Div. 1	3	111	3	3	
M. M.	F	16	White	Class I	2	112	2	2	
S. N.	F	15	White	Class I	3½	112	4	1	
C. N.	M	13	White	Class II	2	108	3	1	
L. O.	M	11	White	Class I	3	109	3	5	Excellent occlusion
M. R.	F	14	White	Class I	2	106	3	5	
M. R.	F	15	White	Class I, D. P.	4	112	3	5	Good occlusion
T. R.	M	14	White	Class I	6	107	4	3	Good occlusion
R. S.	M	16	White	Class I	3	110	3	4	Excellent occlusion
T. S.	M	10½	White	Class I	3	104	3	3	
T. S.	M	11	White	Class II, Div. 1	2	102	3	2	
S. S.	F	14	White	Class II, Div. 1	2½	103	1	5	
M. T.	F	13½	White	Class I	4	103	2	3	
D. W.	M	12	Chinese	Class I	3	114	4	2	Upper lateral cross-bite

Average angle = 108.7°

clarinet, saxophone, flute, and trumpet were taken to demonstrate types of lips. Fig. 7, *A* illustrates a trumpet player, Fig. 7, *B* a clarinet player, and Fig. 7, *C* and *D* a saxophone player. In Fig. 7, *A* and *B* show extensive surplus lip tissue, while *C* and *D* show a saxophone player who is an apparent mouth breather. Fig. 8, *A*,*B*,*C*, and *D* shows two clarinet players with short upper lips.

TABLE III. FLUTE

INITIALS OF SUBJECT	SEX	AGE	RACE	CLASSIFICATION (ANGLE)	YEARS PLAYED	MAXILLARY-INCISAL ANGLE (DEGREES)	POSITION OF HYOID	COMMENTS
C. D.	F	16	White	Class I	2	103	3	
E. D.	M	12	White	Class I	4	107	3	Good occlusion
L. K.	F	14	White	Class I, D. P.	6	120	1	
C. L.	M	15	White	Class I	5	111	1	Excellent occlusion
M. N.	F	15	White	Class I	2	103	1	Good occlusion
G. S.	F	13	White	Class I	4	104	1	

Average angle = 108°

A. *B.*

C. *D.*

Fig. 8.

A survey of thirty Class II, Division 1 cases of youngsters who did not play a wind instrument discloses an average angle of the maxillary palatine bone and maxillary central incisor to be 116.2 degrees.

The average angle of the central incisors of the clarinet players was 108.7 degrees in thirty-two cases (Table II). A comparison with the seven listed Class II, Division 1 clarinet players shows the average angle to be 107.6 degrees (Table II). The average angle for trumpet players is 109.0 degrees in thirty cases (Table I). The average angle in flute players was 108.0 degrees in six cases (Table III). The average angle was 108.3 degrees in fourteen saxophone players (Table IV).

TABLE IV. SAXOPHONE

INITIALS OF SUBJECT	SEX	AGE	RACE	CLASSIFICATION (ANGLE)	YEARS PLAYED	MAXILLARY-INCISOR ANGLE (DEGREES)	INSTRUMENT PLANE (FIG. 6, *A*)	POSITION OF HYOID	COMMENTS
B. B.	M	17	White	Class I	3	105	5	3	Excellent occlusion
D. B.	M	15	Negro	Class I, D. P.	5	121	5	3	Excellent occlusion
H. C.	M	14	White	Class II, Div. 1	4	106	5	5	
D. C.	M	13	White	Class I	3	111	5	5	Excellent occlusion
B. H.	F	12	White	Class I	3	109	4	5	Good occlusion
L. L.	M	17	Negro	Class III, D. P.	3	105	4	4	
B. L.	M	12	White	Class I	3	102	3	1	
W. M.	M	13	Chinese	Class I	3	113	4	1	Excellent occlusion
R. O.	M	14	White	Class I, D. P.	4	118	7		
A. P.	M	16	White	Class II	7	102	5	4	Excellent occlusion
C. R.	M	15	Negro	Class I, D. P.	5	113	5	2	Excellent occlusion
S. S.	F	14	White	Class I	5	113	5	2	
J. V.	M	12	White	Class I	3	95	6	2	
G. W.	M	16	Negro	Class I	2	104	5	2	
					Average angle = 108.3°				

One of the early works of Charles J. Lamp[3] of San Francisco, entitled "Relation of Tooth Evenness to Performance on the Brass and Woodwind Musical Instruments," points out that usually the persons who have the straightest teeth go on to reach a peak of musical performance and that they rise into a prominence where others with irregular teeth fall by the wayside.

It was noted in approximately one-third of the cases studied that there were many youngsters in whom the tooth relationship was classified as "good occlusion" (slightly rotated or displaced teeth) or "excellent occlusion" (as orthodontists would consider them) in closed position only; there were none classified as perfect.

CONCLUSIONS

The belief of some orthodontists that one instrument should be favored over the other in the hope that teeth will be influenced favorably is fallacious. A comparison between the various instruments indicates relatively little difference in the average maxillary incisor angle of the clarinet and trumpet players. Within the clarinet group there was a favorable maxillary incisal angle relationship in the Class II, Division 1 group and this is deserving of more study. It must be emphasized that this group of youngsters surveyed consisted of practically all of the Alameda school department's proficient players. The study indicates that, if the patient is under the proper supervision and is using the correct embouchure, the orthodontist need not concern himself about a clarinet, flute, or saxophone player who may have a Class II, Division 1 malocclusion.

Perhaps it might be in order to emphasize the value of starting early in life to educate and develop the muscular tonicity of the Class II, Division 1 cases with one of the Class B or C instruments, recognizing that the lips, if permitted to remain in nonfunction in the early ages, may never obtain the proper tonicity. It is feasible to expect that the mucosa of the lips may be traumatized during active treatment from sharp or unpolished labial bands, causing the instrumentalist to assume an unnatural blowing position and, in the case of Class C instruments, resort to biting the mouthpiece, thus defeating the advantage gained by the correct embouchure. Every effort should be made by the orthodontist to protect the lips against injury by using highly polished bands* and advocating soft wax where irritations may develop. He should also consult with the music instructor whenever it is deemed advisable. Following the completion of treatment, adequate incisal retention must be established in both the maxillary and mandibular arches. It is felt that the proper embouchure will assist in maintaining the maxillary teeth in a favorable position, but the mandibular incisors will be carried lingually with rotations unless some form of appliance is constructed from the lingual side. Care should be taken to watch these patients, with a longer retention period than normal.

The consistent positioning of the hyoid bone in its closed and rest positions in the trumpet player is more favorable than in clarinet players. This may be associated, in part, to the numerous closed-bite cases observed in the latter group. Perhaps a more balanced tonicity is developed between the internal and external pterygoid muscles, temporal muscles, and the suprahyoid and infrahyoid muscles. Further study of these implications by the researcher is necessary.

The apparent favorable angulation of the maxillary incisors in the clarinet players indicated that the orthodontist should no longer insist that the Class II, Division 1 orthodontic patients play the trumpet, unless there is a complete agreement with the parent and music instructor.

Strayer,[1] in recommending the Class A instrument for all Class II, Division 1 cases, failed to appreciate the many frustrations accompanying such attempts. The Class II, Division 1 patient in Fig. 9 has thrust his jaw forward but cannot negotiate the music instructor's desired separation of the anterior

*Edgewise double-width brackets are apparently quite satisfactory.

teeth because the combination of "thrust" and "open" produces an external pterygoid muscle fatigue. The condyles moving downward and forward attain a position that becomes extremely difficult to maintain. This tracing discloses, for the first time, why many of our patients fail to respond to instrumental therapy. This boy* (a private patient beginning treatment, but not in the Alameda study) has developed his own method of playing and is very proficient in the use of the trumpet. He has been playing the trumpet for four years and is still an extreme Class II, Division 1. One question that is difficult to answer is: What will happen to his proficiency in playing following the completion of orthodontic treatment?

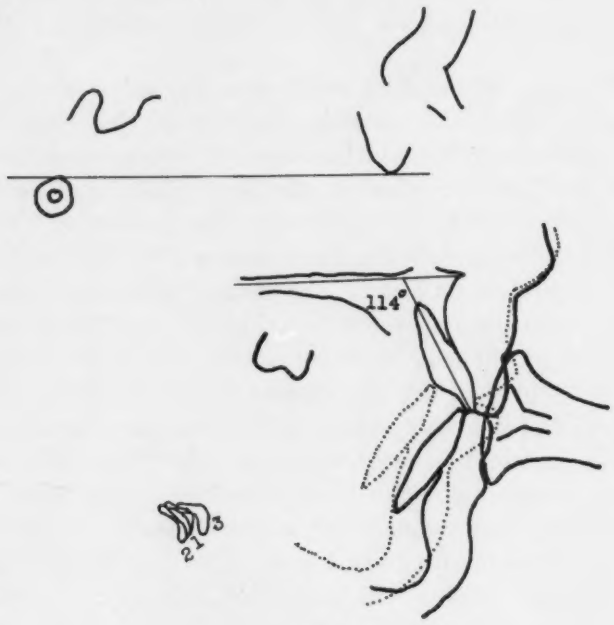


Fig. 9.

From the Alameda study, it is apparent that all of the brass and woodwind instruments must be considered helpful in developing muscle tonicity, particularly for the person who is a mouth breather or who has a short upper lip. It is apparent that it is immaterial which angulation a Class C instrument may assume in the embouchure, although there was a more favorable positioning of the upper central incisors in saxophone players when compared with the clarinet players.

Finally, the Alameda study indicated that there is a favorable influence acting on the teeth from those instruments studied in this project when approached with the correct embouchure. However, not all instrumental music instructors will use the correct embouchure; therefore, all orthodontists should insist that their patients consult qualified teachers in order to maintain and develop the balanced muscular tonicity.

*Two separate headfilms were taken two weeks apart on this patient and each showed the same positioning of the anterior teeth while he was playing his instrument.

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INDIVIDUAL DIAGNOSIS AND CASE ANALYSIS TRANSLATED INTO TREATMENT

HARLOW L. SHEHAN, D.D.S., JACKSON, MICH.

IT IS a privilege to be here and talk with you about a subject of great interest to me, both as a person and as an orthodontist. The subject for discussion first in my mind is my patient, and I would like to discuss him in terms of my assignment, namely, individual diagnosis and case analysis translated into treatment. Here I am personal, as I find it very difficult to think about malocclusion without giving serious consideration to the person who has it. In this connection, I would like to quote one of your own members—Dr. George M. Anderson,* who says, "No one can ever hope to understand the needs of a given malocclusion without seeing the patient, for the plaster model or cast does not show the entire situation."

Thus, in preparation for beginning a diagnosis I feel that I need to know my patients as individual persons before I attempt to learn much about them as orthodontic cases.

Then, too, without being self-centered, I like to think of myself as a person —a person responsible both to myself and to my profession. This leads me to my point of view, and I would like to recommend it for your consideration. In my mind, the *orthodontist himself is, and should be, the best of all diagnostic and treatment instruments.* The finest machine to assist me in making a good diagnosis is the one God gave me, and it lies between my ears. It has taught me to be cautious, to be careful, and to observe well before administering any orthodontic therapy.

As we approach the subject of diagnosis, it may be advisable to call to your attention things which you already know. The first is the fact that each patient is a peculiar and exceptional person in his own right. Whatever may be his arrangements of structure, function, and behavior, he is a self-contained and highly interrelated whole organism or unit. This he must be as a consequence of his heredity, his nurture and growth, his selective accumulation, and his use of the materials taken from his environment.

As a result of very complex systems of action and interactions, of these necessities to life and living, each patient is forced to be individually peculiar. He cannot be otherwise, and proper diagnostic attitude must recognize a cardinal

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*Anderson, George M.: Practical Orthodontics, ed. 8, St. Louis, 1955, The C. V. Mosby Company.

law of biology—the law of the individual, and the unity, coherence, and interrelatedness of the whole organism.

When we think this way we must realize that the information for proper diagnosis must be derived from close observation of the patient whose condition is to be diagnosed.

To observe means to look carefully, to look accurately, to look extensively, and to look well, in order to have a reasonable supply of facts which will enable careful thinking to become effective.

Alfred North Whitehead, recognized as the outstanding philosopher of science of the past century, puts it generally this way (here I use my language rather than his): there are certain unchangeable things known as facts; without these, thinking is useless.

To diagnose means to think, and to think properly about facts pertinent to the patient's orthodontic needs and dental welfare, now and in the future. Otherwise, it would be difficult to defend the proposition that an orthodontic diagnosis had been made. To think and to diagnose means that I acquire sense rather than bias, that I develop judgment instead of conviction, and that I may plan and treat rather than do and hope.

We talk about diagnostic instruments and diagnostic aids, often, I think, in a very loose way. To me, the instrument for an orthodontic diagnosis is an orthodontist, and not a cephalometer or a set of dental models, and a diagnostic aid is another trained person who from time to time may assist in the understanding and treatment of the case, and not a classification system or a device for moving teeth.

Good diagnostic instruments give good and comprehensive statements that enable one to plan in a straightforward and assured fashion. Good tools and techniques for observing provide proper and accurate materials which may be considered in a thoughtful manner.

The great physiologist, Anton Carlson, used to ask a very embarrassing question along these lines: "What is the evidence?" By this, he meant that good thinking about poor or inadequate evidence largely was a waste of time. If this is true, to diagnose means to think well about adequate and proper facts.

The general objective of the orthodontic profession, as well as the particular objectives of the orthodontist for each case, can serve as a guide for the collection of proper facts for making an orthodontic diagnosis. These objectives can be summarized in a brief way, namely: to increase the stabilities and the interdependence of the several parts of the dentofacial and craniofacial complexes so that the area as a whole has higher and more flexible functioning, greater ability to withstand stress loading, and more durability through time.

Within this general frame of reference, we may go further in seeking the facts that will permit better diagnostic thinking. These include the location of assets to workmanship toward greater dento-facial stability. We need to know what is right with the area, to a high degree, as well as what is wrong. In other words, we should become asset minded rather than liability pointed. It is easy to know what is wrong; it often requires skill and persistence to find

out what is right. In a very real sense, if I know what is correct and satisfactory I can make a correct diagnosis and, on the other hand, if I know only what is incorrect and unsatisfactory I wind up making a wrong diagnosis.

Earlier in this article I stated that the materials for proper diagnosis must be derived from close and relevant observations, in order for us to have a reasonable supply of pertinent facts to work with. This, in turn, asks a nice question: "How do I know what important and relevant facts are?" Certainly we can make a start. Here there is universal agreement; occlusal or interdental facts are of utmost importance, since most of our corrective work will involve positioning of teeth, and adapting one arch to the other. We know that teeth in occluded relationship tend to stay put, or fixed, and force many adjustments about them which reduce or prevent the development of a well-integrated dentofacial complex. These "bite locks" do not prevent or change the great asset of all life, adaptability; rather, they force the patient to adjust detrimentally instead of favorably.

Things of this nature are often called interferences to growth and to adaptation. Actually, they interfere but little, if any, with growth or adaptability. They promote a system of poor occlusal relationships where, with orthodontic guidance or direction, they can be used to develop a system of good relationships, stated in a different way, when the bite is locked in a way to produce malocclusion through adaptation, relock so that good orthodontic relationships will be produced. How the unlocking and relocking is to be done will become a part of my treatment plan.

We need to know additional facts. In many malocclusions there are things in addition to bite locks. Here I would like to suggest that adults still have adaptability and that children have both growth and adaptability. Growth is necessary, powerful, and inevitable and, since the orthodontist cannot avoid it, he might as well use it, both in diagnosis and in treatment planning. When growth is still an important phenomenon in my patient, I like to use developmental facts and make what I call a developmental diagnosis in order to formulate developmental plans. My reason is simple: I know that growth is powerful and often can be used as an asset; I also know that it can be a serious handicap to the work I want to do. Consequently, I like to let growth do as much work as possible while I sort of guide, direct, nudge, and tickle in order to get the work which growth does placed where I want it. In my practice, 75 per cent of my patients are still subject to considerable growth, so I regard growth as my unpaid helper—a very good worker but a bit on the temperamental side.

When growth is not important to the case, I like to make what I call a clinical diagnosis and to collect facts and think accordingly.

In my opinion, one cannot think well about growth unless he has facts drawn from both the heredity and the environment of the patient. As a result, I obtain a great deal of information by observing the parents, brothers, and sisters of my patient, when possible, in addition to learning things about his health, diet and nutrition, activity and interests, and his general attitudes and psychology.

Finally, in gathering material for a developmental diagnosis, I like to observe the patient himself for a while in order to know a little bit about how he grows so that I will be able to work with him, rather than against him, as diagnosis and treatment gradually unfold. Particularly, I like to be able to do active treatment work at a time when I feel that I can get maximum results while subjecting my patient to a minimum of treatment and appliance therapy. With all these facts in mind, I get off to a better start with my patients and their parents.

To illustrate, I would now like to present some cases for review and consideration.

CASE 1.—Some cases need attention immediately to take advantage of a striking time period in the growth of the patient or in the unfolding interdental relationship of the deciduous and permanent dentitions. Often when this is not done, serious consequences may result which mutilate the dental areas or which destroy assets to workmanship necessary to effective management of the case. The patient discussed here was a 9-year-old girl who was referred to me by her family dentist. Examination of the patient showed a heavy traumatic condition in the area of $\overline{|1}$, with the soft tissues markedly inflamed and the alveolar process surrounding the anterior part of the root of $\overline{|1}$ resorbed to about one-half the length of the root. This traumatic condition was due to the impact of $\overline{|1}$ being forced to occlude in cross-bite relationship with $\underline{|1}$ for a period of approximately two years. In order to prevent further development of the traumatic condition, it was necessary immediately to correct the cross-bite relationship and to leave the area at rest for a sufficiently

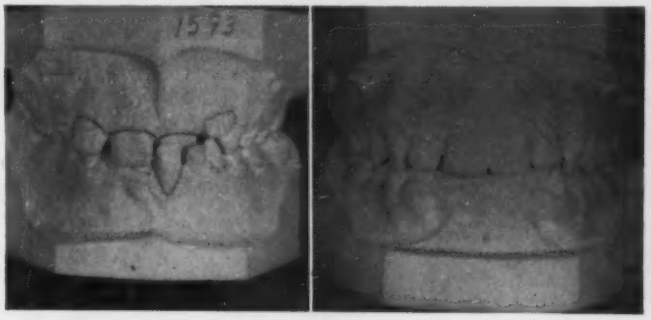

Fig. 1.—Case 1.

long time to permit tissue recovery and adjustment. This was done and a very satisfactory result was obtained in that the tissue recovery was more than was expected. I think that the patient was lucky here and the adjustment which was made showed clearly what the remaining orthodontic problem was and, although this cross-bite correction did not correct the occlusion, it allowed the later serial work to be done uncomplicated by the accumulating damage and adaptation forced by the cross-bite between $\underline{|1}$ and $\overline{|1}$.

This case (and there are many of a similar nature) illustrates the value of striking "while the iron is hot." Here the welfare of the patient would have been taken care of much better if the dentist had referred the case at an earlier time and given the orthodontist the opportunity to guide $\left|\frac{1}{1}\right.$ into proper relationship rather than waiting for serious trauma to develop before instituting treatment.

In conjunction with this case, I would like to voice my opinion that dental schools should better prepare students to recognize things of this nature and thus become more skillful in developmental diagnosis and better prepared to formulate long-range dental treatment plans.

CASE 2.—The patient was a girl, aged 9 years 11 months, who presented a Class III facial appearance. Both the parents and the patient were upset by the "bulldog-like" shape of the little girl's face. The mother was especially upset since she had the same type of appearance as her daughter and wanted, if possible, to prevent her daughter from going through life with "that kind of face." I explained that there were many reasons for treatment, in addition to appearance. I also showed the mother and the patient how

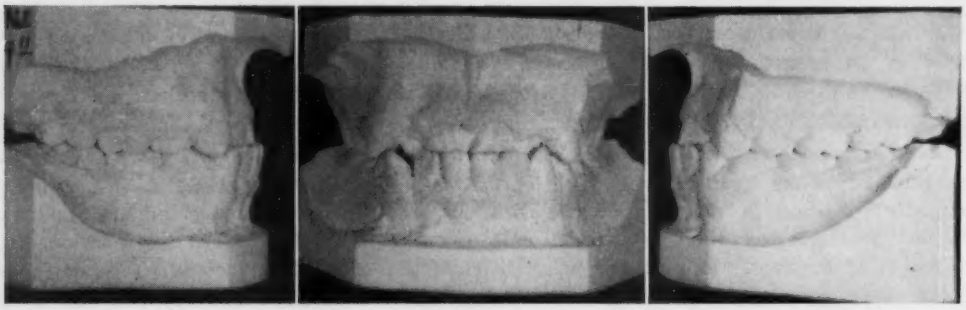

Fig. 2.—Case 2.

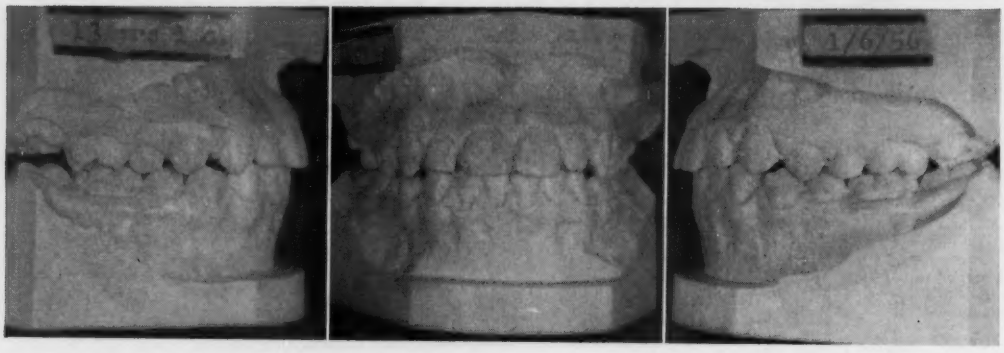

Fig. 3.—Case 2.

this appearance was being created by the way the teeth were forced to occlude with one another. In addition, I pointed out that this unfavorable adjustment to the bite locks needed immediate as well as serial attention. In my opinion, any orthodontist would have been professionally foolish to wait here, in view of the rapidly accumulating adaptations to the locked bite which were forcing a Class III relationship.

The original bony structure of both the maxilla and the mandible were normal, with the mandible carried forward and the maxilla probably slightly distal to compensate for anterior cross-bite and locking. The $\underline{c \mid c}$ in Fig. 2 appear labial and out of position, although actually they are not. Rather, $\underline{21 \mid 12}$ are posteriorly displaced and bunched and lingually locked behind $\overline{21 \mid 12}$, indicating that the locking probably occurred during the eruption period. The relationship of $\frac{6 \mid 6}{6 \mid 6}$ was nearly normal and the maxillary alveolar process was behind the mandibular alveolar process by about 1 to 2 mm. in the anterior areas. The problem was to unlock $\underline{21 \mid 12}$ and move them forward about 2 mm. and then adjust the position of the individual teeth so that they would hold.

To do this, c | c were extracted to facilitate moving of 21 | 12 from a crowded and lingual position; the 6 | 6 were banded and a lingual arch was placed with a soldered reflex spring to press against the lingual of 21 | 12 to move them forward gently and easily. In addition, 21 | 12 were banded and a twin arch was inserted with coil springs over the end tubes to line up 21 | 12 and pull them forward while the reflex spring was pushing from the lingual—a combined operation.

That is all there was to it, for after the bite was unlocked and then relocked in proper position, Nature, now released to act, carried the case on to a highly satisfactory and durable result.

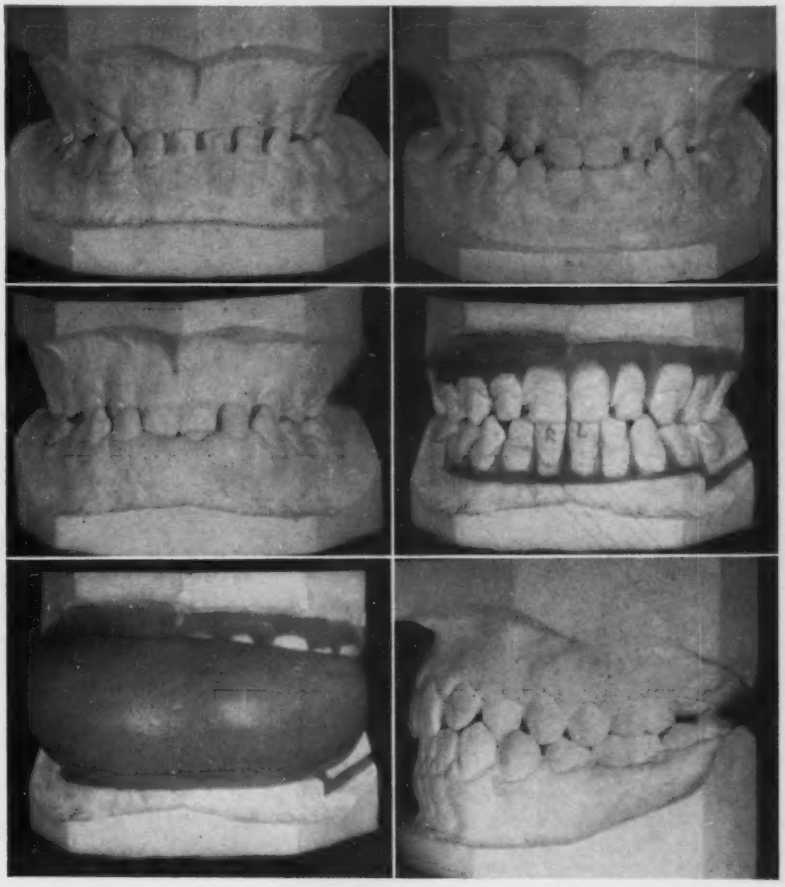

Fig. 4.—Case 3.

CASE 3.—The parents of this 5-year-old boy were very worried about the fact that the upper teeth were locked inside the lower teeth by the forward thrust of the lower jaw. The mother said, "He is forever sticking his chin way out in front." The examination revealed a typical Angle Class III malocclusion with a full cusp mesial relation. The erupted dentition was completely deciduous. The x-ray pictures showed permanent teeth normally developed for the child's age. I was interested in the possibility of hereditary evidence, so I examined the mother, the father, the patient's brother, the mother's brother, and the mother's brother's daughter. No evidence of Class III malocclusion was found in them. In addition, they did not know of any other members of the family who displayed this condition.

Further examination of the patient made it clear that it was Class III in dentition only, and definitely not of Class III appearance in any of the supporting bone structures. The mother was questioned about the thrusting habit. She informed me that the patient's older brother was continually teasing him. This made the patient very angry, and it was during these periods that the thrusting was developed and became established as a habit. With this evidence in mind, a provisional diagnosis of "habit-originated" Class III malocclusion was made, with heredity certainly and growth probably contraindicated as contributing factors. The patient was placed on observation, and when he returned one year later there was no apparent change.

It was now decided to initiate treatment in order to jump the bite and to attempt this in the deciduous dentition, as the x-ray pictures showed $\overline{1 \mid 1}$ well developed and the roots resorbing on $\overline{a \mid a}$, with these teeth beginning to loosen. The $\overline{a \mid a}$ were removed to facilitate treatment.

The patient returned in one month. The $\overline{1 \mid 1}$ had begun to erupt and the relation of $\overline{a \mid}$ to $\overline{1 \mid}$ was almost end-to-end. The bite-jumping treatment was started. The Kesling tooth positioner was selected as the appropriate appliance in this case, since (1) the patient had to travel a distance of 240 miles for an appointment, and I wished to avoid appliance trouble if possible; (2) the Kesling positioner is hard to damage; and (3) very important, both parent and patient showed understanding of the case and, in the year of observation, had given marked evidence of willingness and ability to cooperate. The use of the appliance was demonstrated and the patient was instructed to use it four hours daily, in not less than one-hour periods, in the morning, at noon, and in the evening—and to wear it at night.

Fig. 5.—Case 3.

The mother called at the end of one month and said, "John can now bite end-to-end and he is doing very well in the use of the appliance." The mother was advised to have the boy continue and to come in for examination in a month.

At this time the $\frac{1 \mid 1}{1 \mid 1}$ were assuming correct position and the remaining teeth were moving toward proper relationships. The Kesling positioner was used at night only until $\frac{b \mid b}{b \mid b}$ began to be lost. When $\frac{2 \mid 2}{2 \mid 2}$ began eruption at 7½ years of age, a maxillary lingual arch was placed in the patient's mouth to hold $\overline{21 \mid 12}$ in proper anterior relationship, which was obtained at 9 years of age. The appliances were removed and the case was placed on observation at six-month intervals.

The development continued satisfactorily until the boy reached the age of 13 years 9 months, at which time $\frac{3}{3}$ began to be locked in cross-bite relationship. To correct this, the tongue blade technique was used with immediate and stable response.

The patient was examined again at 14 years 9 months of age, and at this time there was a correct and stable state of occlusion which verified the original diagnosis and plan for developmental treatment.

The three cases which have just been presented illustrate the importance of correct guidance in order to use the adaptability of the patient in a way that contributes favorably rather than detrimentally to his welfare.

Various labels are attached to this type of practice. Some call it interceptive and preventive orthodontics; others say they are using observation and simple treatment; and some call it "timing and placing" as a method of diagnosis and treatment. All orthodontists do work and thinking of this nature. Furthermore, there can be no doubt that the dental profession as a whole is looking to the orthodontist for advice and education in this area. I like to think of this as progressive diagnosis and treatment; in my opinion, we would do a great deal of good if we were able to observe and to direct, when advisable, the developing dentofacial relations for each child, beginning with the eruption of the deciduous teeth and continuing at a minimum until the adult dentition is established in occlusion. In other words, the role of the orthodontist in long-term dental planning and practice is of utmost importance.

CASE 4.—Some cases are best managed cooperatively in order to use the diagnostic skill and treatment planning of others than the orthodontist. The present case used the training of Dr. Chalmers Johnson, dentist, Dr. Daryl Ostrander, endodontist, and myself, orthodontist. The patient, a boy aged 9 years 3 months was referred to me by Dr. Johnson; I, in turn, immediately enlisted the aid of Dr. Ostrander, and together we worked out the diagnosis and subsequent treatment. At this time the patient's condition was classified as Class I with the $\frac{6 \mid 6}{6 \mid 6}$ approximately normal, as were the anteroposterior relationships of $\frac{6\,5\,4\,c \mid c\,4-6}{6-4\,c \mid c\,d\,e\,6}$. The supporting areas were well developed for the boy's age and also were in good relationship. The $\underline{2 \mid}$ was about three-fifths erupted to the labial side and was rotated about 45 degrees. The $\underline{2 \mid}$ was forced out of position by $\underline{(1-1) \mid}$ a fused

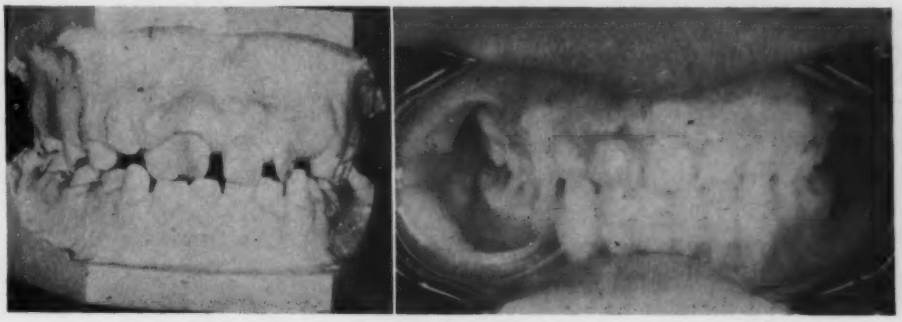

Fig. 6.—Case 4.

central incisor, which was shown by the x-ray picture to have two roots and probably a common pulp. There was 2.5 mm. of space between $\underline{(1-1) \mid 1}$ with $\underline{\mid 1^s}$, a supernumerary central incisor, rotated 45 degrees. The $\underline{\mid 2}$ was unerupted, but this did not create a problem since it had 6 mm. of space. The relationships between $\overline{21 \mid 12}$ were generally normal. The orthodontic problem lay in the upper arch between $\underline{c \mid c}$ and was centered in the fact that there were $\frac{2\,(1-1) \mid 1-1^s\,2}{2\;\;1\;\;\;\;\mid 1\;\;2}$ when the usual anterior formula is $\frac{21 \mid 12}{21 \mid 12,}$ for which there is more than adequate space. Actually, there was space for five teeth so it was decided to bifurcate the crown of $\underline{(1-1) \mid}$ and to retain the half which had the better

root. The x-ray film showed the distal root to have the better form and shape, so it was decided to extract the mesial half of the fused tooth, with root canal therapy being indicated. The bifurcation confirmed the suspicion of a common pulp and made the root canal work necessary. The order of procedure was bifurcation, removal of the mesial half of (1-1)|, and root canal therapy in the distal half.

The patient was now ready for the orthodontist. Here the plan of treatment was to align 2 (1-)|1-1s 2 and to adapt this alignment to the requirement of the lower arch, with the main problem being to place (1-)| in proper position. To do this, 6 2 (1-)| 1-1s 2 6 were banded and an upper lingual arch was inserted. Then a twin arch was placed on the labial side with a coil spring between the upper right end tube and (1-)|. Then an interlaced figure-of-eight ligation, which included 2 (1-)|1-1s 2, was used for the closure of the spaces. After proper alignment and space closure were accomplished, a jacket crown was placed on (1-)| to better match its appearance with |1 and as a protection against damage on the mesial margin where the bifurction was made. The lower arch adapted itself to the work in the upper arch and was untouched by appliances.

The result has given the patient and his parents great satisfaction. The occlusion has remained stable for two years now and promises to last into the future.

Here the welfare of the patient has been managed properly by correct usage of the skill of other trained men as diagnostic and treatment planning aids in a way that correctly exemplifies the dental profession as a whole.

CASE 5.—This case may be called familial, since I came in contact with the patient, a 7-year-old boy, while treating his brother who was 11 years old. The older brother, my first patient of the family, was under treatment because 5| was labially blocked out of the arch due to mesial drift of 6| following premature loss of e|. Although this boy presented a Class I malocclusion dentally, he had Class III facial features which were so strongly marked that I was almost sure that he also had a Class III malocclusion until I examined the dentition. In addition, he presented a very shallow overbite in 21|12 which, with the very strong Class III facial features, led me to open the space to take care of 5| very slowly in order to avoid getting an anterior open-bite.

Fig. 7.—Case 5.

During the course of this treatment, the mother mentioned to me that she would like for me to look at her younger son, since she thought that his jaw was not developing properly. This was done and casts were made as shown in Fig. 7. The examination revealed the e|e to be mesial to e|e by approximately one-half tooth; |c d e to be in cross-bite relationship with |c d e; with |6, now one-fifth erupted, also going into cross-bite relationship; and with the anterior teeth in slight open-bite relationship. The mandible was already large in relation to the maxilla, both laterally and anteroposteriorly.

At this stage I asked the mother if someone else in the family beside the patient's brother had a tendency toward a large lower jaw. She replied, "Come to think of it, my

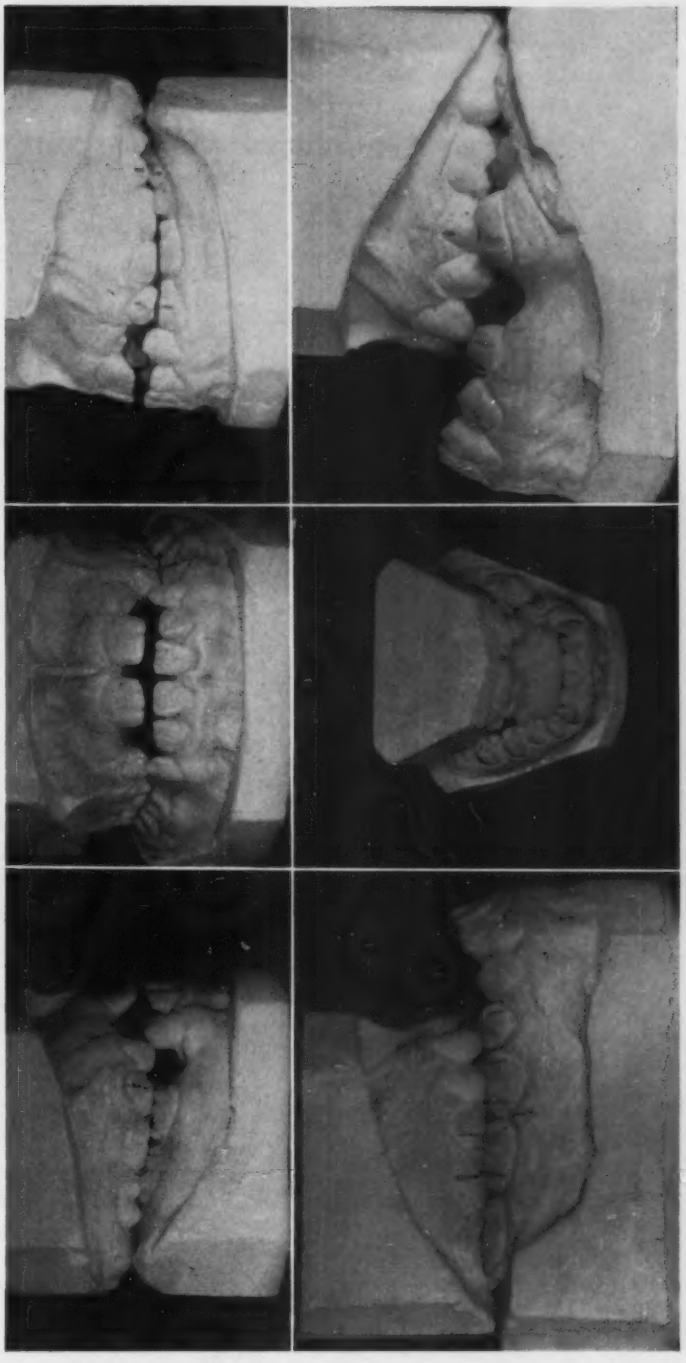

Fig. 8.—Case 5.

Fig. 9.—Case 5.

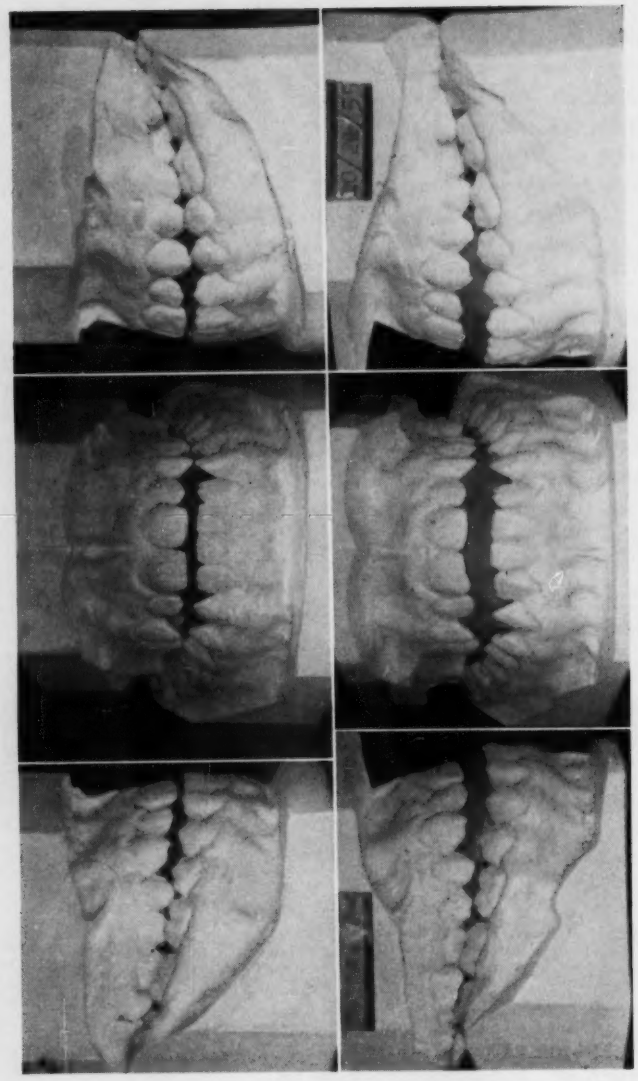

Fig. 10.—Case 5.

husband has a rather prominent lower jaw.'' I then told the mother that the boy was too young to treat and that he should be placed under observation. I told her to bring the boy back in a year and to bring the father in too so that I could see if heredity was involved in the case.

The patient and his father returned twenty-one months later. Models were taken of the boy and his father (Fig. 8), and verified my earlier suspicions concerning heredity. The father had a mesial relationship of 27 mm. on the right side and 25 mm. on the left side. Obviously, only one type of treatment was possible for the father, namely, jaw resection; this was done when then father was 44 years old, with Dr. Reed Dingman, Dr. Gerald Barrows, and myself cooperating in diagnosis, planning, and treatment. The extent to which this work was satisfactory is shown in Fig. 9. I questioned the father regarding the development of his lower jaw and he said that he knew his jaw was getting so big that it made him look different from other people when he was 18 or 19 years old. He also remembered that his jaw seemed to ''grow worse'' until he was 25 or 26 years old. This suggested to be a probability of very late growth in the boy which could easily force resection as part of the treatment. So I decided to *observe and be sure.* This was carefully explained to the father.

By this time the boy was 8 years 9 months old. The crossbite relationship involved 6 e d c 21 | 12 c d e 6 with the corresponding lower teeth, the $\overline{6 \mid 6}$ were mesial to $\underline{6 \mid 6}$ by one-half cusp, and the anterior open-bite now extended $\underline{c \mid c}$ and had increased in amount.

The patient was observed and models were taken at 10 years 4 months of age, at 12-2, 13-4, 14-4, and 15-4 years and months of age, respectively. During this time there was some, but not much, change in the dental relationships.

The next observations and models were taken at 17 years 1 month of age. By this time the open-bite had increased in amount and extent and now was present from $\underline{7 \mid}$ to $\underline{\mid 4}$, with the beginning development of an upper right shift relative to the mandible.

This development continued until the next observation period at 19 years 6 months of age. Now the only teeth in occlusion were $\frac{7 \mid 7}{7 \mid 7}$, with the bite open all the rest of the way. The $\overline{6 \mid}$ was mesial to $\underline{6 \mid}$ by one-half of a tooth. The anterior asymmetry had increased so that $\underline{1 \mid}$ was to the right of $\overline{1 \mid}$ by one-half the width of the tooth and the cross-bite was more severe throughout.

The next observations and models were taken at 24 years 7 months, with intervening models having to be omitted because the patient was in the Armed Forces. By now, there has been a very marked opening of the bite and a very marked forward thrust of the mandible over the maxilla, and it is evident that the case has gone far beyond orthodontic limits and must be managed by resection and subsequent orthodontic control similar to the father's case.

Further observation and close attention to change forced by continuing growth will be necessary, since any further growth after resection would be a very serious liability. When there is assurance that there will be no further growth the patient will be placed under treatment, with the oral surgeon and the orthodontist cooperating in management of the case. In view of the success obtained on the father under less favorable conditions, we may look forward to a probably good and stable result with the patient.

This case is truly one involving developmental diagnosis in the comprehensive sense of the word, and as we watch the details gradually unfold we become aware of the great strength and power of growth and heredity. The warning that this could easily occur was given the first time the patient was observed at the age of 7 years and was markedly emphasized the first time the father was observed.

Proper diagnosis requires the use of important and relevant facts. Here we note how growth and heredity have gradually supplied us with the necessary evidence. Any treatment instituted prior to knowing the true nature of this case would have been doomed to failure and would have been very detrimental—not only to the well-being of the patient, *but also to the status of orthodontics* as a profession.

We have already emphasized that proper diagnosis, case analysis, and treatment planning are essential skills which each orthodontist must apply to the patient and his case if successful results are to be obtained. These professional skills usually must be brought into action by appliances if the task at hand is to be completed. Here I would like to suggest that the appliances which any person uses should represent both the orthodontist and the profession well. Good appliances, in themselves, cannot and do not make good orthodontists; poor appliances can translate excellent diagnosis and treatment planning into very poor orthodontic results.

Good appliances, like good orthodontists, have to be sensitive, efficient, stable, durable, and with enough flexibility to fit the demands of the case. Otherwise, the judgment of the orthodontist cannot become the result on the patient.

It happens that in my hands the Johnson twin arch is the appliance of choice.

In conclusion, proper diagnosis leads to success in treatment. Improper diagnosis often leads to confusion and failure. Proper diagnosis gives satisfaction to the patient and his parents, as well as to the orthodontist. Improper diagnosis leads to complexity in treatment and often provides feelings of frustration in the patient and feelings of professional inadequacy in the orthodontist.

CEPHALOMETRIC EVALUATION OF ORTHODONTIC THERAPY INVOLVING THE USE OF TISSUE- AND TOOTH-BORNE ANCHORAGE

EDWARD A. LUSTERMAN, D.D.S., F.A.C.D., ROCKVILLE CENTRE, N. Y.

INTRODUCTION

ORTHODONTIC therapy in our time seems to be experiencing another swing of the pendulum, this time with respect to the use of extraoral force, as opposed to intraoral force, for the movement of teeth and the correction of malocclusion. We have been subjected in the past to the immoderate stand of the extractionists versus those just as violently dedicated to nonextraction; those who are slavishly and uncompromisingly devoted to multi-banded techniques as opposed to those who advocate simpler therapies; those who feel that Class II malocclusions can always be corrected by mandibular repositioning pitted against those who believe that that is an unattainable objective.

In matters biologic and physiologic, however, the necessity of weighing the tangibles and intangibles, the ponderables and imponderables, must give us pause. There are so many permutations and combinations of factors with regard to facial type, vectors and increments of growth, and muscular function and balance that one must rely on continuous study and research and the sifting of large masses of clinical evidence in order to reach a moderate and temperate stand with respect to his own professional attitudes and behavior.

Thus, when one reads: "Extraoral anchorage is the only truly stationary anchorage. We cannot overestimate the fact that no reliable unyielding anchorage can be estalished in the mouth,"[1] such a statement should not be taken literally, but must be subjected to further exploration. Let us remember that never is a long, long time. Or when, as in a recent text,[2] a chapter is devoted to "The Inadequacy of Intra Oral Reciprocal Orthodontic Force," as cogent as the facts and conclusions presented may appear to be, they must nevertheless be scrutinized more thoroughly, acting as a spur and a challenge to our efforts to develop more suitable and effective techniques. Perhaps there is more than one answer to the question of anchorage, and we should, by our continued efforts, learn how to harness it to advantage.

Now, with the advent and subsequent utilization of cephalometric radiography as a modality in assaying results in clinical orthodontics, we are presented with unparalleled opportunities for advancement through research. Moreover, much has been learned in recent years, through this medium, regard-

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ing growth and development, and the impact of this newer knowledge on diagnosis and treatment planning is evidenced by the end results of treatment, which are unquestionably better, by and large, than those obtainable even a generation ago.

I have felt for some time that certain procedures with respect to anchorage have stood me in good stead, enabling me to treat out many types of cases, either with or without extraction, in a shorter period of time, with greater safety to the underlying tissues and with less danger of relapse upon completion because muscular balance has not been violated.

Basic to these procedures is the use of tissue- and tooth-borne appliances which involve a minimum of tooth banding, and hence a marked reduction in injury to the periodontal tissues. Bedell,[3, 4] Moyers and Higley,[5] and Higley[6] have employed, with good reason, what they term removable anchorages, or stabilizing plates as anchorage reinforcements. Their major concern was to combine the teeth and alveolar structures in the mandible into a solid unit of resistance, and in the maxilla to include the palate as well. Their advocacy of lingual attachments, however, has certain disadvantages, both with regard to ease of placement and removal of the appliance and as a deterrent to effective molar repositioning, which is usually desirable, particularly in deep overbite cases. This latter point will be demonstrated later in the cephalometric analyses.

Anchorage, a nautical term, means "to fix firmly, to make fast in order to check motion." Unfortunately, we have too long been chained to the shibboleth that anchorage in orthodontics can always be satisfactorily obtained by the utilization of varying types of arch wires attached to teeth. In the light of more recent developments, it is fallacious to stress the use of teeth alone as a source of anchorage, defining it as simple or stationary by depending, respectively, on whether round arches are used with round tubes or rectangular or square wires and tubes are employed on the anchor teeth.[7] We are, I believe, more or less agreed that stationary anchorage, so employed, is at best an elusive and ephemeral thing. Angle[8] stated, "The resistance of the anchorage must be greater than that offered by the tooth to be moved, otherwise there will be displacement of the anchorage. . . ." It is apparent that he recognized the hazard in utilization of anchor teeth only and attempted to overcome it by multiple tooth banding and the use of a more rigidly attached appliance. More recently, Strang[9] emphasized the use of torque force with the edgewise arch to further enhance stability. However, Brodie,[10] in his teaching, recognizing the primary importance of conserving the integrity of the underlying osseous structures, stated that "the undisturbed tooth affords the best anchorage." This leads us logically to Rohde,[11] who comes nearest the truth in his contention that " . . . teeth in themselves do not constitute anchorage. They are merely our means of attachment and serve us through their attachment of the periodontal membrane to bone, which is our true source of anchorage."

Would it not be wise, then, for us, recognizing as we do the limitations and hazards inherent in so-called "stationary" intraoral anchorage, to re-evaluate our thinking, and possibly our nomenclature, with regard to it? Perhaps it would be more accurate to define intraoral anchorage as the utilization

of the greatest possible area of undisturbed bone and tooth structure which can serve as resistance to force. With this in mind, and recalling the definition of anchorage (namely, "to fix firmly, to make fast in order to check motion"), we must bear in mind that anything we do in orthodontics when we use teeth only as the source of anchorage violates this principle to a greater or lesser degree, for the mere placement of separating wires, to say nothing of multiple band placement, causes change and weakening of surrounding tissues and underlying bone. When further stress is applied by subjecting these teeth to elastic traction, a condition is set up which some have aptly termed a "softening of anchorage."

It is pertinent here to point out some of the limitations and disadvantages inherent in the use of the several appliance therapies which have long been employed as anchorage for intraoral reciprocal force. The lingual arch, when employed alone in the mandibular dentition, has not always proved effective since, aside from the strain thrown upon the "anchor" molars, elastic traction causes the arch wire to ride up on the anterior teeth. This frequently results in tipping and displacement, with resultant anterior crowding due to the upset in muscular balance. The labial arch, among other inadequacies, requires many ties for stability, which can be irritating to the patient and cause decalcification at the necks of the teeth. Any multi-band technique is capable of creating a great deal of displacement of teeth and insult to the periodontium, resulting in crowding, muscular imbalance, and premature aging of the dentition.

When, in addition, mandibular anchorage is prepared[12] with the edgewise technique, several other disadvantages may accrue. There are, of course, cases in which there is excessive mesial axial inclination of teeth in the mandibular buccal segments, with or without slight crowding and elevation of the incisors. In these cases some distal movement and elevation of the buccal teeth, and possibly depression of the anterior teeth, are desirable to obtain a general leveling of the occlusal plane. This can be best accomplished with the edgewise mechanism by using slight tip-back bends and Class III mechanics, as originally brought out by Tweed. I rarely band the four anterior teeth during the course of this procedure, but band them later, if required.

The fact remains, however, that in this, as in any other arch technique under protracted treatment with Class II elastic traction, there is great danger that the mandibular anchorage will not hold.[2] An inherent weakness in the entire procedure, when used thus, is that unless some effort is subsequently made to conserve the gains made by so leveling the occlusal plane, failure may result. We have found that the tendency for weakening and collapse of anchorage can be avoided, at that point when Class II elastic traction is required, by removing all the band material, with the exception of the first molars, and resorting to an appliance that will firmly utilize the bone and teeth as subsequent anchorage. Such an appliance is shown in Fig. 1 and will be described later. We are indebted to Dr. J. H. Sillman, who, to the best of my knowledge, was the first to design and advocate the use of this type of appliance. I have made certain modifications designed to make it more functional, better fitting, and easier to fabricate.

Furthermore, in utilizing the Class III mechanics necessary in this procedure, a Hawley bite plate may be employed for anchorage in the maxillary arch, fortified, if necessary, by cervical or occipital headgear. Figs. 2 and 3 demonstrate an application of these mechanics, by means of which mandibular anterior tooth alignment was made possible. This case was treated by removing one mandibular anterior tooth. Since not enough room was available for the alignment of the remaining teeth, Class III mechanics were employed to increase mandibular arch length. In this instance a Hawley bite plate was employed, without adjunctive extraoral therapy, thus using the maxillary arch and palate as anchorage. The elastics were worn for several months prior to the removal of the bands on the lower teeth, with the result shown in the progress

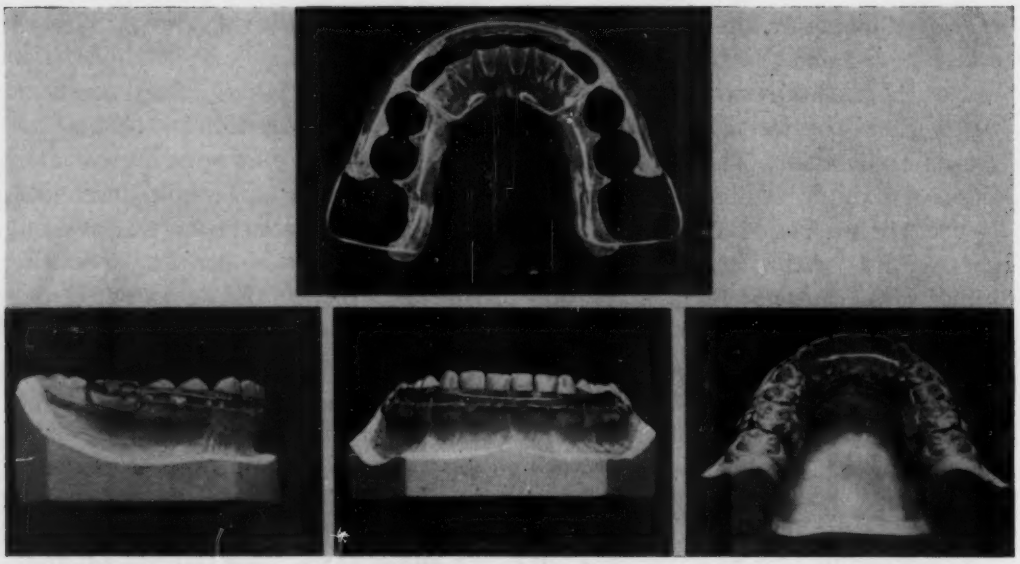
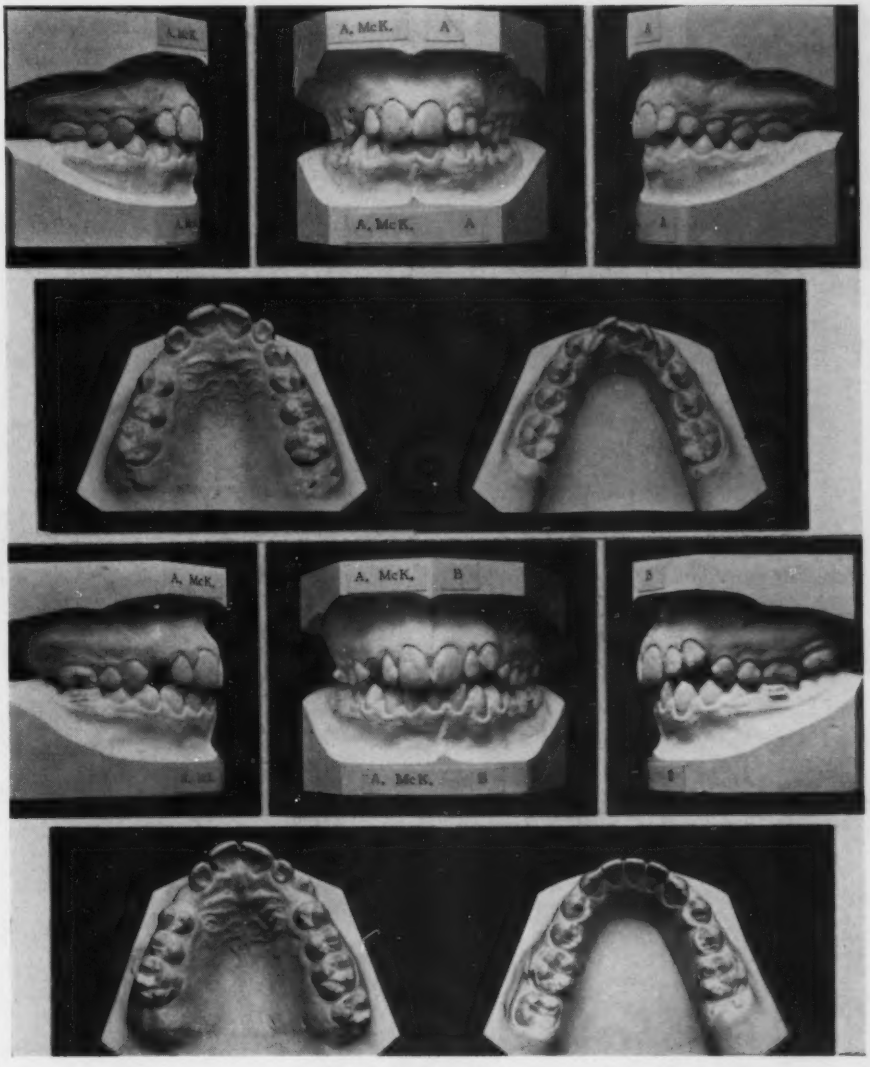


Fig. 1.—Above, tissue- and tooth-borne appliance used as a splint for mandibular anchorage. Below, the appliance as employed for intermaxillary elastics. Left, note molar band and hook for elastic; center, front view; right, lingual view, showing coverage of teeth and tissue.

models (Fig. 2, *B*). The case is still under treatment; these casts show the preparation of the mandibular arch only. At this point a splint (Fig. 1) will be employed in the mandibular arch for the Class II mechanics required for completion of treatment, which may also be used later as a retainer. This therapy is suggested to supplant that advocated by some operators, that is, adapting a full edgewise mechanism to a maloccluded, crowded maxillary denture which, aside from being a laborious, time-consuming procedure, has the added disadvantage of creating further crowding and straining of the maxillary anchorage. The superposed tracings (Fig. 3) disclose that there has been good over-all growth in both jaws with considerable improvement in the facial angle and in denture height. It is obvious that the maxillary teeth have maintained their relative angular relationships, despite the use of the arch as anchorage for Class III mechanics with the Hawley bite plate. We also may note the distal tipping of the lower molar as a result of this therapy, a factor which

is contributory to overbite correction. These findings were confirmed in a table prepared similarly to those shown later in the case reports. Another factor of advantage in this technique is derived from the fact that opening the bite, accomplished by use of the bite plate, is almost always requisite for effective mandibular leveling.

A.



B.

Fig. 2.—Patient A. McK., casts. *A*, Before treatment; *B*, progress models following the preparation of the mandibular arch. The mandibular left lateral incisor was removed, and the buccal segments moved distally to create sufficient room for anterior alignment. A Hawley bite plate, utilizing the palate and maxillary teeth, was employed as anchorage.

In concluding these introductory remarks, it seems fitting to discuss briefly the uses and limitations of extraoral anchorage, whether occipital or cervical. Certainly no one would deny its usefulness in early treatment or its effectiveness as an adjunct in the conservation of anchorage. It should also be noted that

extraoral force at times may be most useful and necessary in those cases requiring treatment in one arch only. However, as Graber[13] has pointed out, there are many limitations when it is employed as the only therapeutic force in cases which may be best treated with intermaxillary traction. Among these are, chiefly, the difficulties in obtaining overbite correction and the excessive tipping of the maxillary incisors in overjet correction. Those who use this type of anchorage exclusively also lose sight of the fact that intermaxillary force can be a most salutary force in that it may effectively influence condylar growth and aid in changing mandibular posture in many cases; overbite and overjet corrections are also aided by intermaxillary force, when coupled

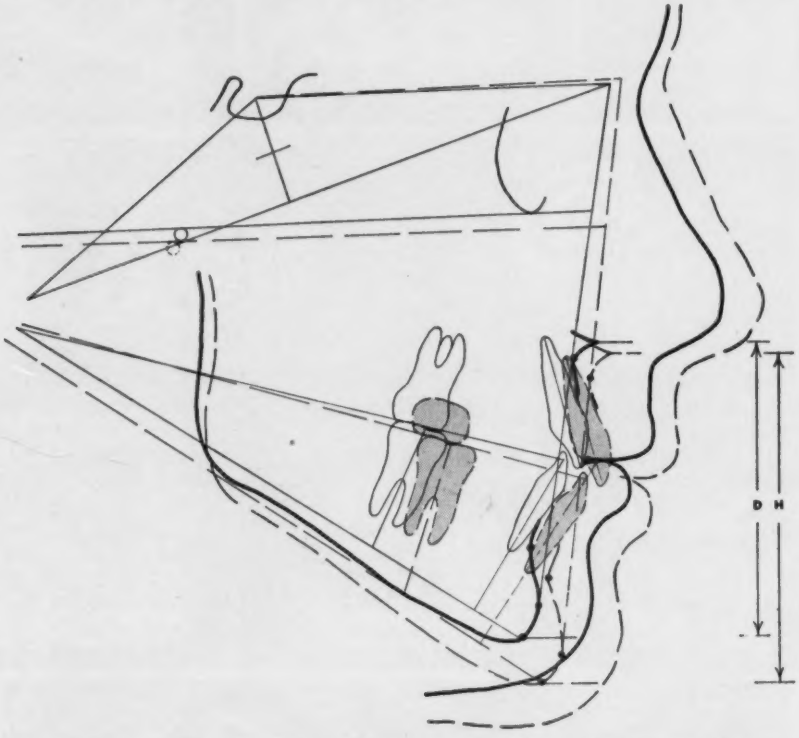


Fig. 3.—Patient A. McK. Superposed tracings of cephalometric roentgenograms. Hawley bite plate used as anchorage for Class III mechanics to increase arch length for anterior mandibular alignment. Note stability of maxillary denture. Solid line, January, 1954; broken line, February, 1956.

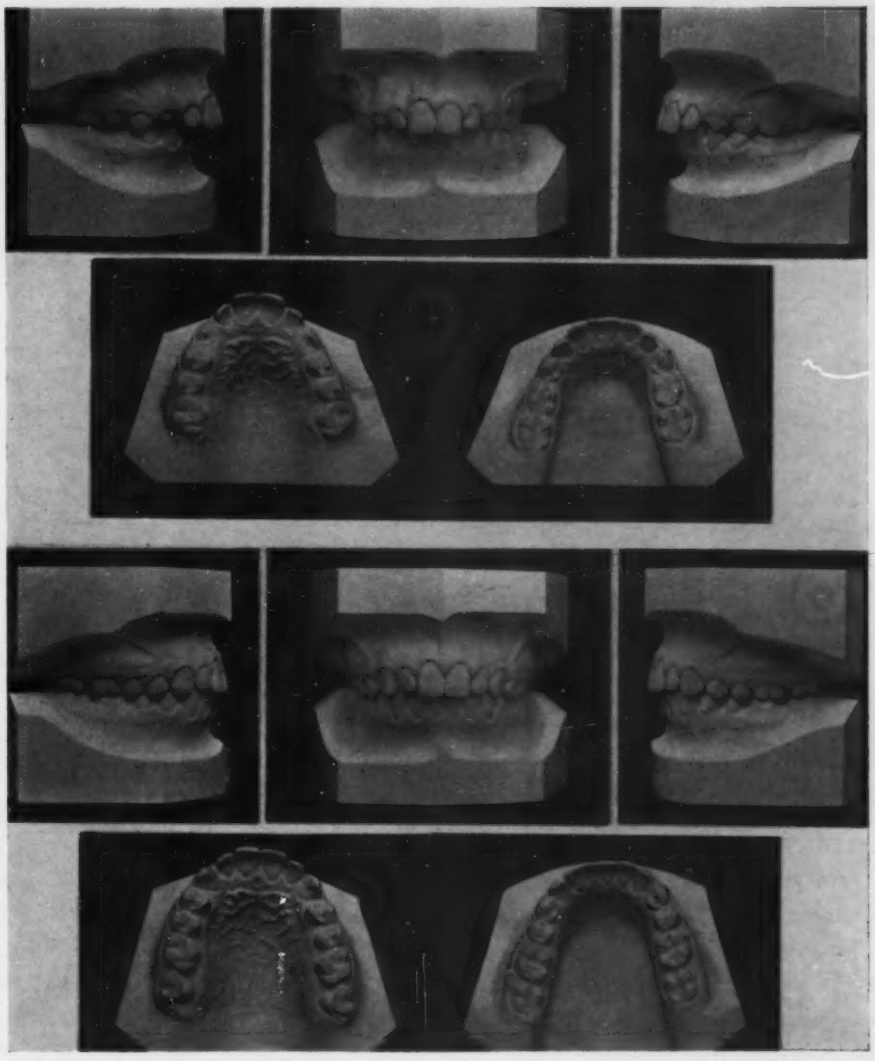
with mechanics designed to conserve anchorage while obtaining proper cuspal relationships. It is hardly necessary to add that, even if the exclusive use of extraoral force did not possess the disadvantages mentioned, the necessity of using it as a half-time measure undoubtedly results in an increase in treatment time, with its attendant dangers.

METHOD

In view of the foregoing, and in order to substantiate the principles herein expressed with regard to anchorage, several types of treated cases will be analyzed. The appliances employed for anchorage will be illustrated. Before- and after-treatment casts will be shown, and the results of treatment will be

tested by means of lateral cephalometric radiographic studies. The cephalometric analysis employed is based upon the work of Downs[14] and Reidel,[15] to which the reader is referred, and superimposition of tracing, utilizing point R, is in accord with the technique of Broadbent.[16] This type of analysis was employed by me in previously published case reports;[17, 18] it utilizes only those

A.



B.

Fig. 4.—Case 1, Patient D. Z., casts. *A*, Before treatment; *B*, after treatment.

measurements and angles which, in my opinion, have the greatest clinical significance. In addition, angle 1 is added (Fig. 5); this is the posterior angle formed by a line passing vertically through the center of the left mandibular first molar with the mandibular plane (GO-GN). Another measurement added is

the denture height (DH), measured in millimeters, from the anterior nasal spine to gnathion. All measurements shown in the tables were taken from tracings which were drawn in detail but, for the sake of clarity in presentation, most of the lines have been left out of the tracings shown herein.

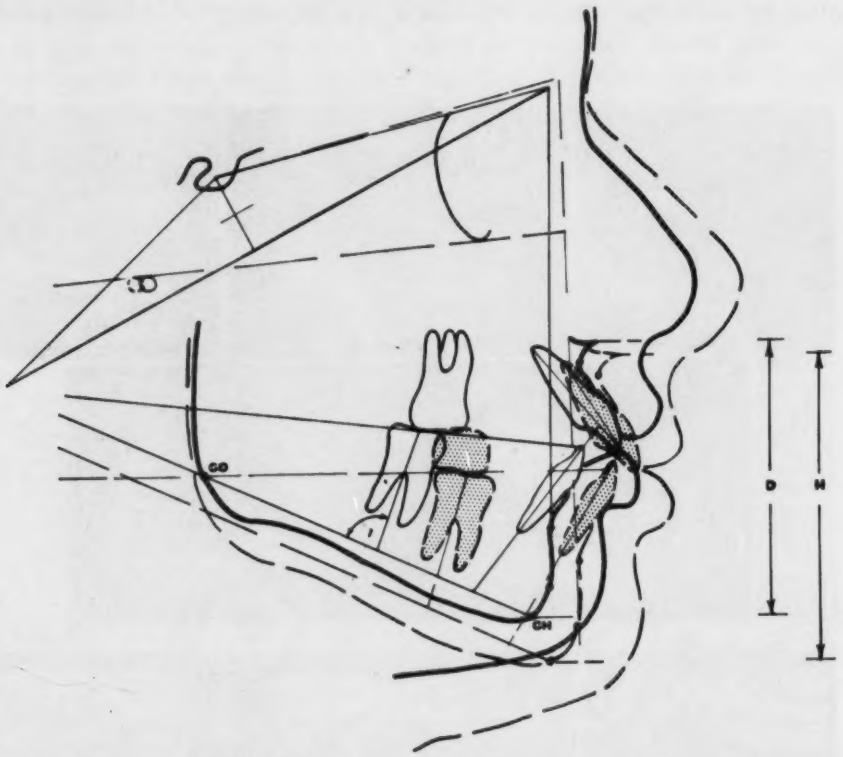


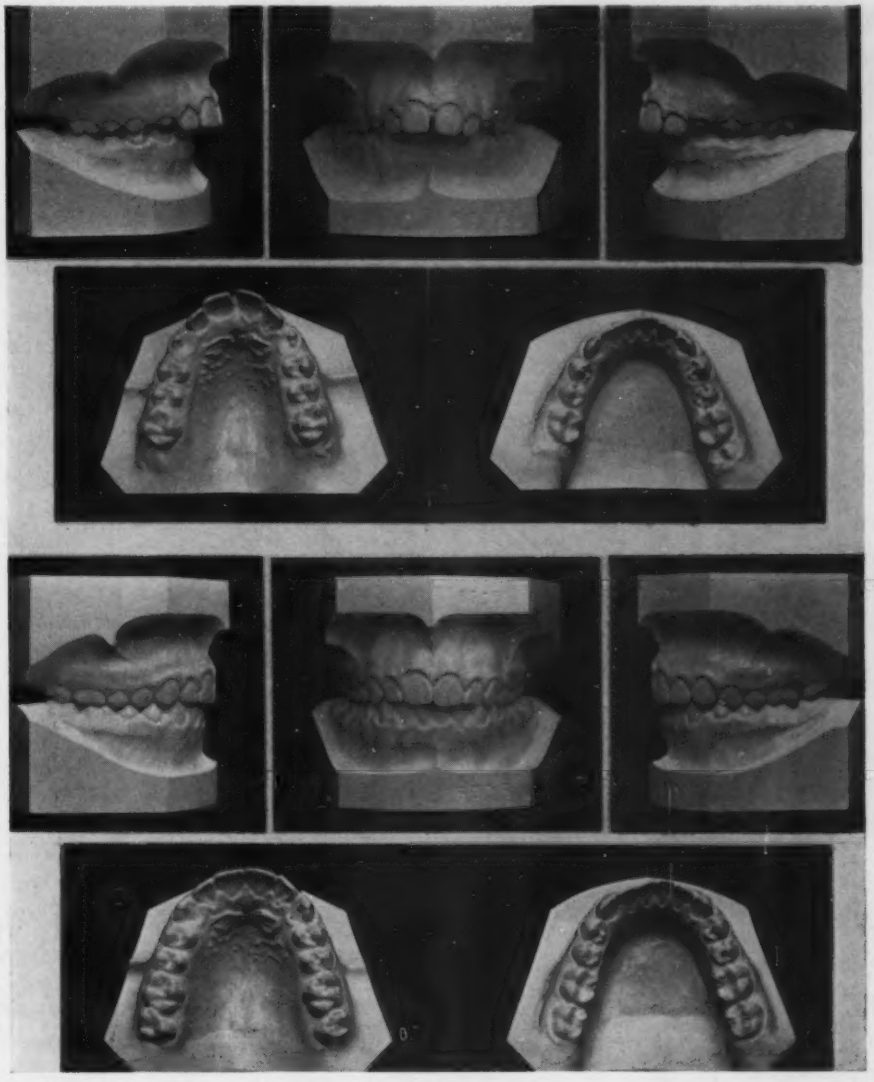
Fig. 5.—Case 1, Patient D. Z. Superposed tracings of cephalometric roentgenograms. Solid line, March, 1950; broken line, July, 1954. *1*, Angular relationship of $\overline{|6}$ to mandibular plane (*Go-Gn*); *DH*, denture height, measured from anterior nasal spine to gnathion.

CASE REPORTS

Class II, Division 1 (Nonextraction).—Many cases of this type fall into a special category, in that they all have substantially "good lowers." That is, the teeth are well positioned with respect to basal bone; arch form and contact relationships are normal; and the mandible and superimposed teeth bear, more or less, good relationship to cranial anatomy. This, of course, holds true of many cases treated in this class, and has even been estimated to be true in as many as 75 per cent.[19] In an exhaustive investigation conducted in England,[20] the conclusion was reached that ". . . the disharmony . . . is due more frequently to excessive forward growth of the upper jaw than to retrusion or undergrowth of the lower jaw." In other words, these cases should be considered as maxillary protrusions, either dental or dento alveolar, and treated as such, often without the removal of teeth. Moreover, many cases in this category may have a procumbent mandibular incisor pattern, consistent with racial type. There is no rule of thumb which demands that the incisors be uprighted on the mandibular plane to 90 or 95 degrees; if the facial pattern is

pleasing, consistent with racial type, and the periodontium is healthy and arch integrity is intact, we feel that it is often best to leave the entire mandibular arch as undisturbed as possible.

A.



B.

Fig. 6.—Case 2, Patient J. H., casts. *A*, Before treatment; *B*, after treatment.

A case of this latter type (Case 1, Patient D. Z.), is shown in Figs. 4 and 5. A case of the former type (Case 2, Patient J. H.), presents a rather large mandibular plane angle with an upright mandibular incisor pattern, but again the entire mandible and dental arch are in fairly good relationship to cranial anatomy. This case is shown in Figs. 6 and 7.

Both cases were treated similarly, in that a Hawley bite plate was first inserted in an effort to level the occlusion and increase denture height.* During this process of mandibular leveling, bands were formed on the maxillary teeth, exclusive of the anterior teeth for subsequent edgewise mechanics, after which bands with intermaxillary hooks were formed and cemented on the first molars, an alginate impression was taken, and on the stone model an acrylic splint was processed as shown in Fig. 1.

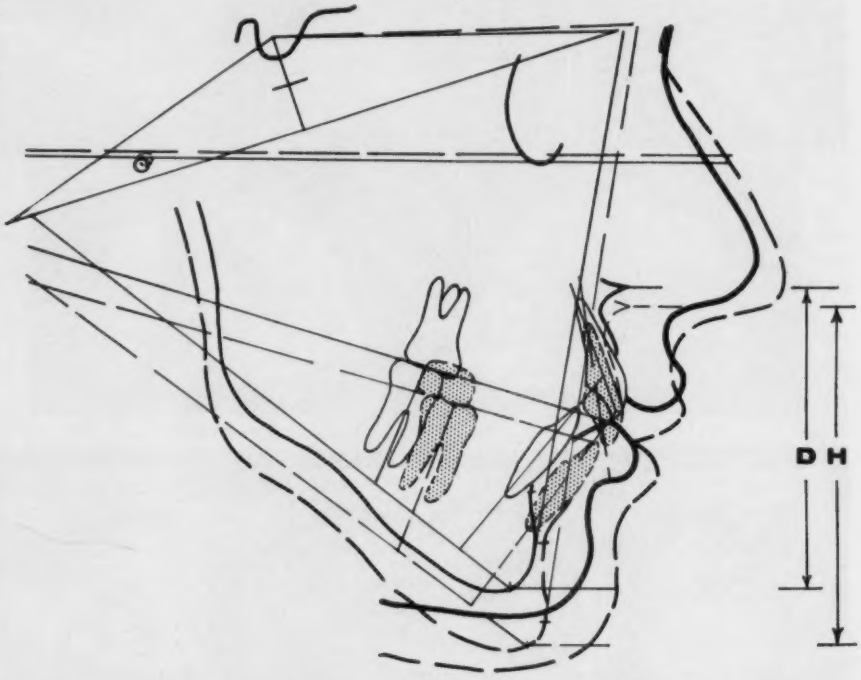


Fig. 7.—Case 2, Patient J. H. Superposed tracings of cephalometric roentgenograms. Solid line, December, 1951; broken line, February, 1955.

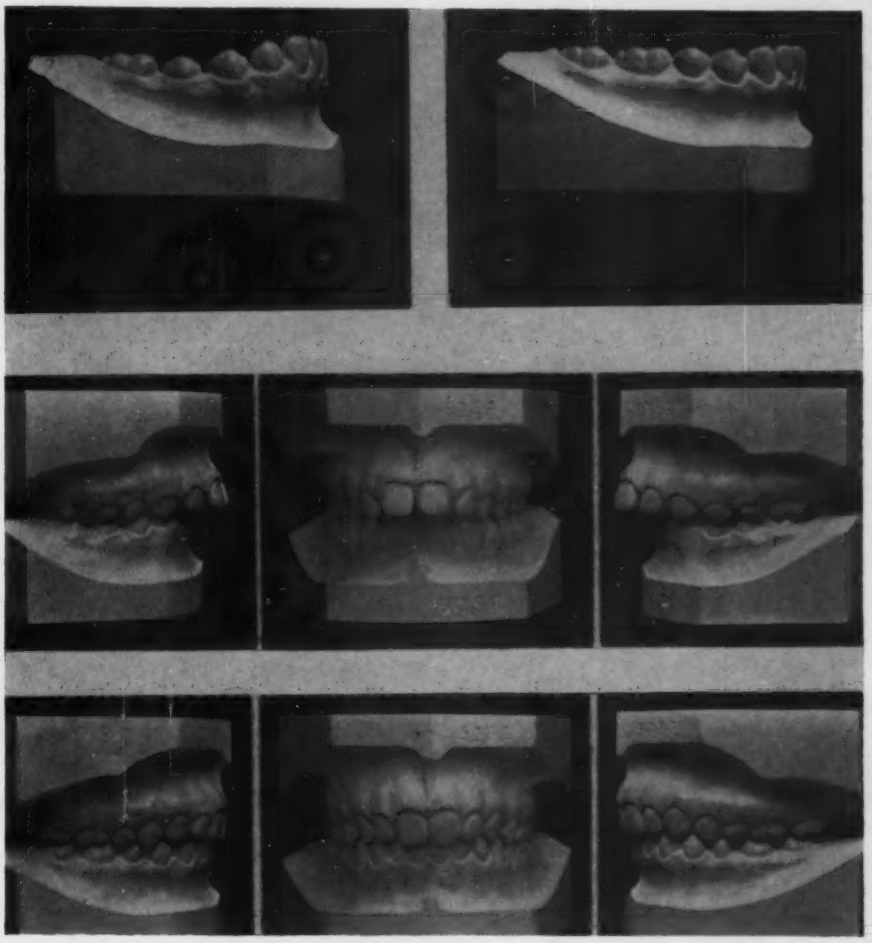
This splint is so fabricated that it is rigid and well fitting, and is easy for the patient to insert and remove. By covering about one-half of the lingual surface of the anterior teeth, extending the acrylic down over the mucosa, and holding the teeth from molar to molar firmly with a labially and buccally adapted 0.030 inch soft stainless wire imbedded in acrylic, a solid block of resistance, utilizing teeth and bone, is created for elastic traction. This, of course, must be worn at all times when the elastics are used. Thus used, only two movements are possible—one limited to the lower first molar itself, in that it will be tipped backward and upward, by the elastic traction, and the other a possible change in posture or spatial relationship of the mandible itself, in toto. When proper

*The efficacy of this phase of treatment has long been adequately demonstrated clinically in the growing child, and recent research by Sleichter[21] is most revealing in proving its usefulness as an adjunct in orthodontic therapy. Fig. 8, *A* shows the effect of the use of a Hawley bite plate after several months' wear in a case with an even deeper curve of Spee than those now described; the extent of overbite correction following treatment may be seen in the before and after casts (Fig 8, *B*).

cuspal relationship had been established in the buccal segments, the maxillary anterior teeth were banded and the cases were completed with routine edgewise mechanics.

In both these cases, as evidenced by the casts and superposed tracings, it is evident that there is good esthetic improvement, which may be attributed to several factors, notably an increase in denture height due essentially to

A.



B.

Fig. 8.—*A*, Initial leveling of occlusion of mandibular arch with Hawley bite plate; left, before treatment; right, after treatment. *B*, Above, casts before treatment; below, after treatment with edgewise appliance therapy.

growth, but aided by the distal tipping and raising of the mandibular first molars, and posterior positioning of the maxillary teeth. This, of course, allows for improved spatial positioning of the lip musculature and opportunity for the subsequent development of tonus. In Case 1 (Figs. 4 and 5, Table I) there was no relative difference between SNA and SNB, but the 2 degree difference in the facial angle may be significant of either a greater forward spurt of

TABLE I

CEPHALOMETRIC ANALYSIS — CASE 1, PATIENT D. Z.	MARCH, 1950	JULY, 1954	CHANGES	CONTROL GROUP (MEAN)
Facial angle	84	86	+2	85.33 (Reidel)
Angle SNA	81	83	+2	80.79 (Reidel)
Angle SNB	75	77	+2	78.02 (Reidel)
Difference	6	6		+2.77 (Reidel)
Angle of convexity	+7	+6	−1	+4.22 (Reidel)
Mandibular plane angle	29	28	−1	27.06 (Reidel)
Y axis angle	60	61	+1	59.4 (Downs)
Angle |1 to $\overline{\|1}$	101	114	+13	130.40 (Reidel)
Angle $\overline{\|1}$ to mandibular plane	104	97.5	−6.5	93.52 (Reidel)
Angle $\overline{\|1}$ to occlusal plane	59	58	−1	71.79 (Reidel)
|1 to facial plane	14 mm.	12 mm.	−2 mm.	6.35 mm. (Reidel)
Angle $\overline{\|1}$ to NS	116	109	−7	103.54 (Reidel)
Cant of occlusal plane	12	5	−7	+9.3 (Downs)
Angle $\overline{\|6}$ to mandibular plane	87	84	−3	
Denture height (ANS-GN)	52 mm.	57 mm.	+5 mm.	

growth in the mandible than in the maxilla or some change in mandibular posture. The probability is that both occurred to some extent. In Case 2 (Figs. 6 and 7, Table II) we note that there is relatively little change in the facial angle, but 3 degrees difference in the angle of convexity, denoting that the maxillary base had been brought posteriorly, while the mandible maintained its spatial relationship to the face and head.

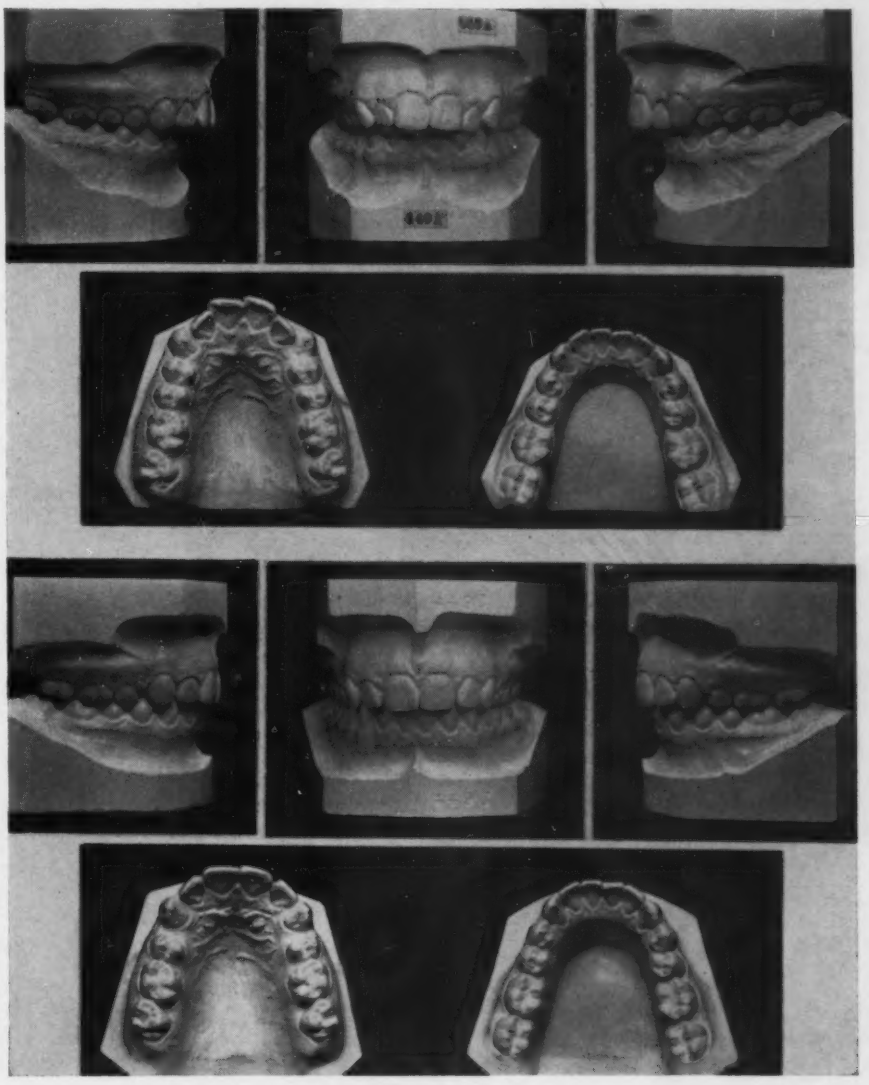
TABLE II

CEPHALOMETRIC ANALYSIS — CASE 2, PATIENT J. H.	DEC., 1951	FEB., 1955	CHANGES	CONTROL GROUP (MEAN)
Facial angle	81	81.5	+0.5	85.33 (Reidel)
Angle SNA	84	82	−2	80.79 (Reidel)
Angle SNB	77	77	0.0	78.02 (Reidel)
Difference	7	5		+2.77 (Reidel)
Angle of convexity	+11	+8	−3	+4.22 (Reidel)
Mandibular plane angle	38	37	−1	27.06 (Reidel)
Y axis angle	67.5	67	−0.5	59.4 (Downs)
Angle |1 to $\overline{\|1}$	120	128.5	+8.5	130.40 (Reidel)
Angle $\overline{\|1}$ to mandibular plane	91	90	−1	93.52 (Reidel)
Angle $\overline{\|1}$ to occlusal plane	67	69	+2	71.79 (Reidel)
|1 to facial plane	12 mm.	7 mm.	−5 mm.	6.35 mm. (Reidel)
Angle $\overline{\|1}$ to NS	107.5	96	−11.5	103.54 (Reidel)
Cant of occlusal plane	16	15	−1	+9.3 (Downs)
Angle $\overline{\|6}$ to mandibular plane	76	74	−2	
Denture height (ANS-GN)	58 mm.	64 mm.	+6 mm.	

It is unnecessary to go into great detail with respect to all changes in the analyses. It is sufficient to state that they are, in the main, consistent with successfully treated cases; the significance of most of the figures may be found in the literature. We are highly interested, however, in consideration of our views on anchorage, in two particular measurements: (1) angle 1, signifying the angular relationship of $\overline{|6}$ to the mandibular plane, and (2) angle $\overline{|1}$ to the mandibular plane (Fig. 5).

In both cases we find that the mandibular anterior teeth had been tipped back, markedly in Case 1 (from 104 to 97.5 degrees) and slightly in Case 2. Reference to the figures shows that the molars had also been tipped back several degrees. The significance of these changes will be discussed later, but it is pertinent here to note that both cases had been out of retention for some time prior to the final models and tracings.

A.



B.

Fig. 9.—Case 3, Patient S. L., casts. *A*, Before treatment; *B*, after treatment.

Class II, Division 1 (Extraction $\frac{4}{4}$).—Case 3, Patient S. L. (Figs. 9 and 10, Table III), had a facial angle of 73 degrees indicative of a backward divergent mandible. Extraction in the mandibular arch was contraindicated; it would have worsened esthetics, complicated treatment, and resulted in failure

generally. A splint, previously described, was inserted on the mandibular denture and edgewise appliance therapy was instituted with Class II elastics. Leveling of the mandibular arch was unnecessary. The final figures in the table were taken and the completion models were made about one year out of retention.

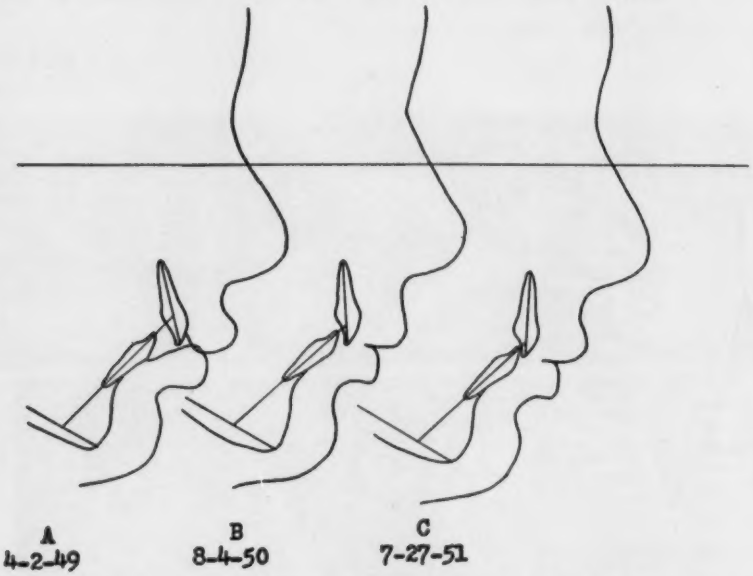


Fig. 10.—Case 3, Patient S. L. Profile study made from cephalometric roentgenograms. *A*, Before treatment; *B*, after treatment; *C*, postretention.

While the angle of convexity has been markedly reduced, the facial angle remained fairly constant. Note also that, while the $\lfloor\overline{1}$ to mandibular plane angle remained constant, there has been a most marked reduction of $\lfloor\underline{1}$ to NS, concomitant with a great increase in denture height. These factors aided in the esthetic improvement, as noted previously. In the serial tracing shown

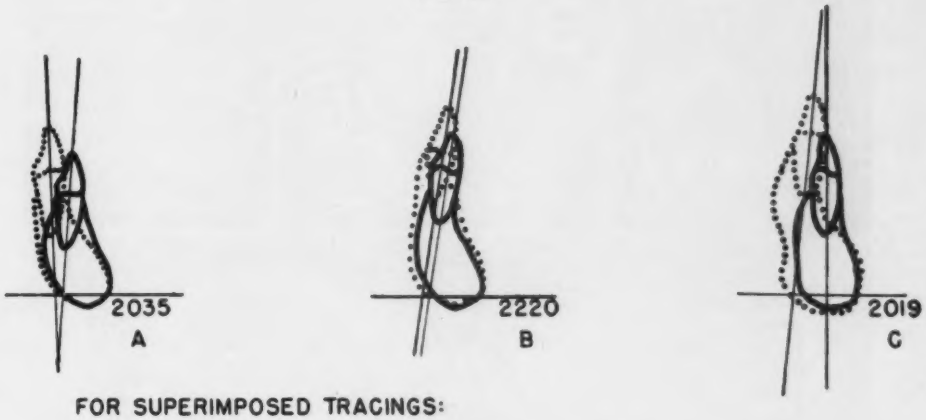
TABLE III

CASE 3, PATIENT S. L.	CEPHALOMETRIC ANALYSIS MARCH, 1949	JULY, 1951	CHANGES	CONTROL GROUP (MEAN)	
Facial angle	73	74	+1	85.33	(Reidel)
Angle SNA	82.5	79	−3.5	80.79	(Reidel)
Angle SNB	75	73	−2	78.02	(Reidel)
Difference	7.5	6		+2.77	(Reidel)
Angle of convexity	7	4.5	−2.5	+4.22	(Reidel)
Mandibular plane angle	31	32	+1	27.06	(Reidel)
Y axis angle	71	73	+2	59.4	(Downs)
Angle $\lfloor\underline{1}$ to $\lfloor\overline{1}$	122	137	+15	130.40	(Reidel)
Angle $\lfloor\overline{1}$ to mandibular plane	104	104	0.0	93.52	(Reidel)
Angle $\lfloor\overline{1}$ to occlusal plane	63	67	+4	71.79	(Reidel)
$\lfloor\underline{1}$ to facial plane	14 mm.	9 mm.	−5 mm.	6.35 mm.	(Reidel)
Angle $\lfloor\underline{1}$ to NS	105	88	−17	103.54	(Reidel)
Cant of occlusal plane	18	23	+5	+9.3	(Downs)
Angle $\lfloor\overline{6}$ to mandibular plane	88	86.5	−1.5		
Denture height (ANS-GN)	58.5 mm.	63 mm.	+4.5 mm.		

we may observe (*C*) the further uprighting of $\underline{|1}$ and the continued improvement in the modeling of the lips, especially the upper one, which took place after the maxillary Hawley retainer had been discarded.

This aspect of postretention, that is, the continued uprighting of incisors following correction in cases out of retention, is a phenomenon that has interested me for some time. Schaeffer,[22] in a study of incisor axes in growth, demonstrated that the incisors occupy a more posterior position relative to their

Fig. 11.



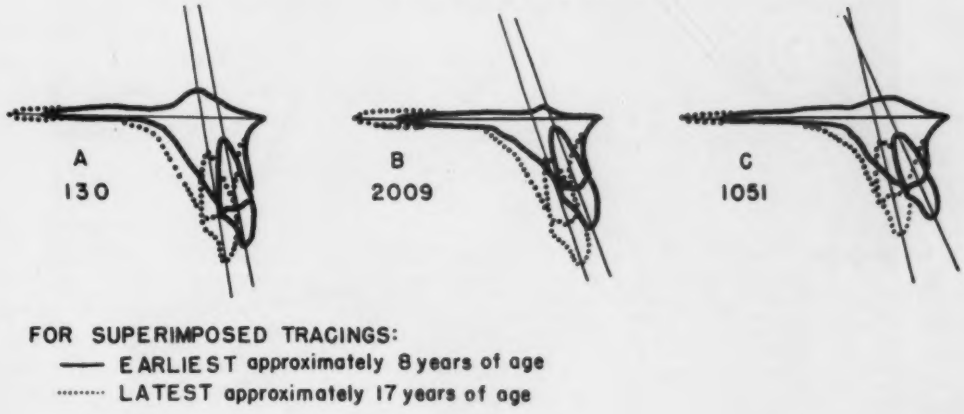


Fig. 12.

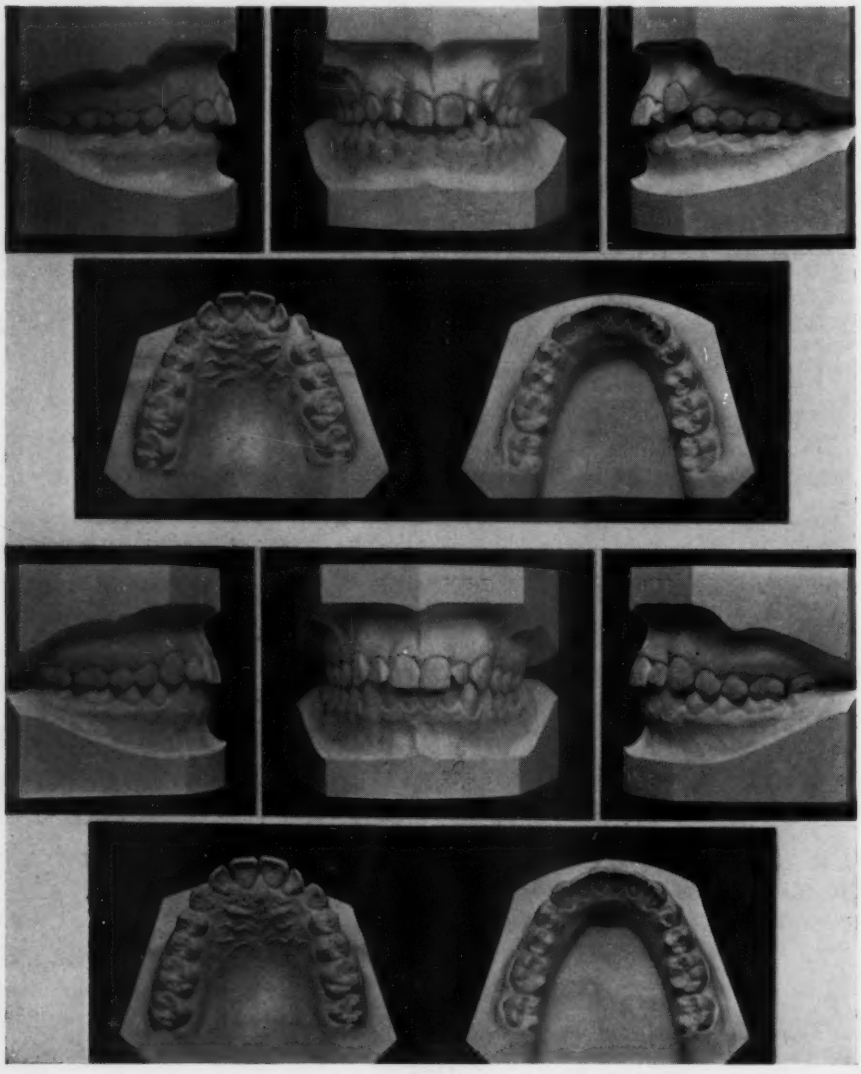
Fig. 11.—Posterior position of mandibular incisor after a period of growth. (From Schaeffer: *Angle Orthodontist* **19**: 254-275, 1949.)

Fig. 12.—Posterior position of maxillary incisor after a period of growth. (From Schaeffer: *Angle Orthodontist* **19**: 254-275, 1949.)

supporting bones with growth of the facial skeleton. He advanced this as a possible explanation for the progressive esthetic improvement observed in persons exhibiting dental prognathism in earlier years. His study was made on untreated cases, but his conclusions, of course, would apply to treated cases as

well. Figs. 11 and 12 show, respectively, the posterior positioning of the mandibular and maxillary incisors during growth. If care is taken during treatment with the edgewise mechanism to exercise the proper torque movements of the incisor roots, it is reasonable to assume, if Schaeffer's deductions are correct, that we should observe a continued bodily uprighting of the incisors following retention, with the elimination, to a great extent, of unsightly tipping.

A.



B.

Fig. 13.—Case 4, Patient D. S., casts. *A*, Before treatment; *B*, after treatment.

This has often been observed clinically following proper treatment, and is understandable, especially in cases wherein extraction has been resorted to and sufficient space has been made available for the subsequent shifting and placement of teeth on the bony base.

In six cases reported here, however, we may observe that in all of them, no teeth were removed in the mandibular arch, all having had splint therapy as previously described. We may note from the tables that in two of them (Cases 1 and 4) there has been a marked change in the mandibular incisor axes, the angle having been decreased. In the other cases this angle has remained essentially the same, but in none has it increased, except for one in which there was an increase to a very slight degree.

An interesting corollary, therefore, in this analysis of cases out of retention presents itself. It had been assumed that, with the use of the splint for mandibular anchorage, no change would take place in tooth positioning with respect to the incisors, because of the enhanced stability obtained. However, I was especially intrigued and gratified to find that, consistent with Schaeffer's findings, a continued posterior positioning of the mandibular incisors took place in many cases following the retention period, a factor which undoubtedly contributed to better functional and esthetic results.

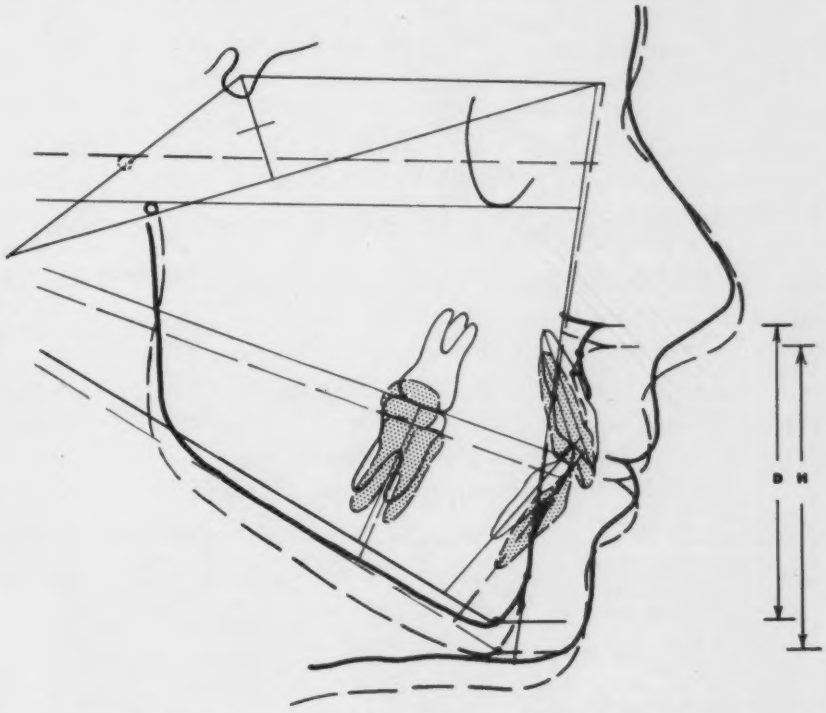


Fig. 14.—Case 4, Patient D. S. Superposed tracings of cephalometric roentgenograms. Solid line, November, 1951; broken line, July, 1954.

Class II, Division 2.—In Case 4, Patient D. S. had a fairly good skeletal pattern (Figs. 13 and 14, Table IV). The facial musculature was hypertoned; esthetics presented no particular problem, except that it was a prime consideration not to violate muscular balance during treatment, which would have worsened esthetics and invited failure. The patient was extremely uncooperative, and requested that all appliances be removed so that $\underline{|2}$ could be jacketed prior to its contemplated rotation and completion of the case. The completion casts were made six months following the removal of all bands and appliances;

TABLE IV

CEPHALOMETRIC ANALYSIS — CASE 4, PATIENT D. S.	NOV., 1951	JULY, 1954	CHANGES	CONTROL GROUP (MEAN)
Facial angle	82	81	−1	85.33 (Reidel)
Angle SNA	87	86	−1	80.79 (Reidel)
Angle SNB	83	82	−1	78.02 (Reidel)
Difference	4	4		+2.77 (Reidel)
Angle of convexity	10	8	−2	+4.22 (Reidel)
Mandibular plane angle	31	30	−1	27.06 (Reidel)
Y axis angle	65	66	+1	59.4 (Downs)
Angle $\lvert\underline{1}$ to $\lvert\overline{1}$	119	123	+4	130.40 (Reidel)
Angle $\lvert\overline{1}$ to mandibular plane	101	96	−5	93.52 (Reidel)
Angle $\lvert\overline{1}$ to occlusal plane	69	72	+3	71.79 (Reidel)
$\lvert\underline{1}$ to facial plane	10 mm.	9 mm.	−1 mm.	6.35 mm. (Reidel)
Angle $\lvert\underline{1}$ to NS	112	109	−3	103.54 (Reidel)
Cant of occlusal plane	20	20	0.0	+9.3 (Downs)
Angle $\lvert\overline{6}$ to mandibular plane	84	82	−2	
Denture height (ANS-GN)	56	57.5	+1.5	

no retainers were placed. Edgewise mechanics were employed in the maxillary arch; a splint on the mandibular arch again was utilized for tissue- and tooth-borne anchorage. It is interesting to note that, concomitant with the decrease in the facial angle and the angle of convexity (the maxillary base and teeth having been moved posteriorly), there has also been a reduction of 5 degrees in the $\lvert\overline{1}$ to mandibular plane angle, again confirming Schaeffer's findings. In this case there was no forward mandibular growth; most of it had taken place on the inferior border and at the gonial angles. It is obvious that the re-establishment of occlusion was due almost entirely to orthodontic therapy; growth played a relatively small role.

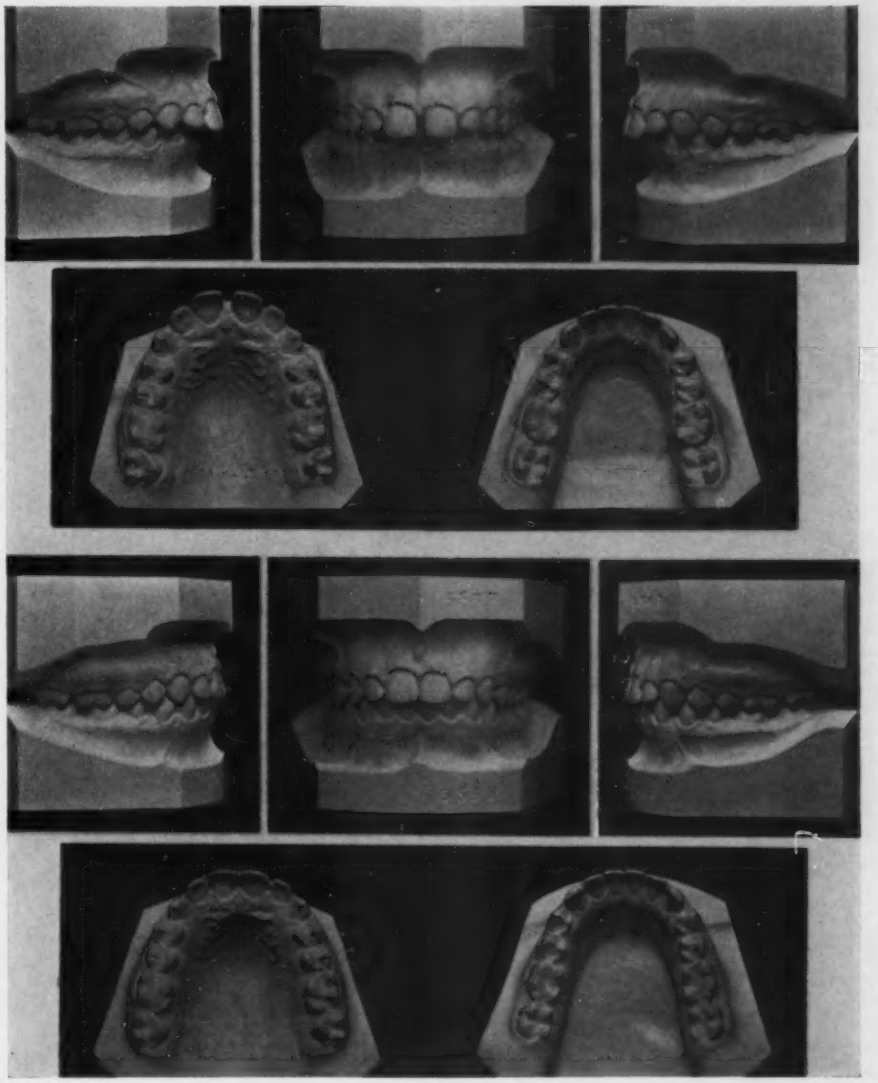
Class I.—Case 5, Patient T. G. (Figs. 15 and 16, Table V), is that of a boy with a deep overbite and a wide diastema between the maxillary central incisors. There are many who would consider this case a bimaxillary protrusion; in accordance with our views on racial considerations in diagnosis, we did

TABLE V

CEPHALOMETRIC ANALYSIS — CASE 5, PATIENT T. G.	SEPT., 1950	FEB., 1953	CHANGES	CONTROL GROUP (MEAN)
Facial angle	82	84.5	+2.5	85.33 (Reidel)
Angle SNA	82	84	+2	80.79 (Reidel)
Angle SNB	76	78	+2	78.02 (Reidel)
Difference	6	6		+2.77 (Reidel)
Angle of convexity	10.5	10	−0.5	+4.22 (Reidel)
Mandibular plane angle	28	29	+1	27.06 (Reidel)
Y axis angle	62.5	62	−0.5	59.4 (Downs)
Angle $\lvert\underline{1}$ to $\lvert\overline{1}$	114	113	−1	130.40 (Reidel)
Angle $\lvert\overline{1}$ to mandibular plane	105	105	0.0	93.52 (Reidel)
Angle $\lvert\overline{1}$ to occlusal plane	61	59	−2	71.79 (Reidel)
$\lvert\underline{1}$ to facial plane	14 mm.	11 mm.	−3 mm.	6.35 mm. (Reidel)
Angle $\lvert\underline{1}$ to NS	106	108	+2	103.54 (Reidel)
Cant of occlusal plane	17	12	−5	+9.3 (Downs)
Angle $\lvert\overline{6}$ to mandibular plane	85	81	−4	
Denture height (ANS-GN)	62.5 mm.	69 mm.	+6.5 mm.	

not consider it as such and therefore confined our treatment to the maxillary arch, using the splint previously described on the mandibular denture. Edgewise therapy was employed with Class II elastics to effectuate space closure, and arch adjustments were made to decrease the anterior overbite and overjet. A frenectomy was performed late in treatment. Reference to the tracing and

A.



B.

Fig. 15.—Case 5, Patient T. G., casts. *A*, Before treatment; *B*, after treatment.

table discloses that there has been a very marked skeletal growth; the increase in the facial angle, in view of the fact that angles SNA-SNB and the angle of convexity had remained constant, denotes that there may have been relatively greater forward mandibular growth, some change in mandibular posture, or both. Growth on the inferior border of the mandible has contributed to a

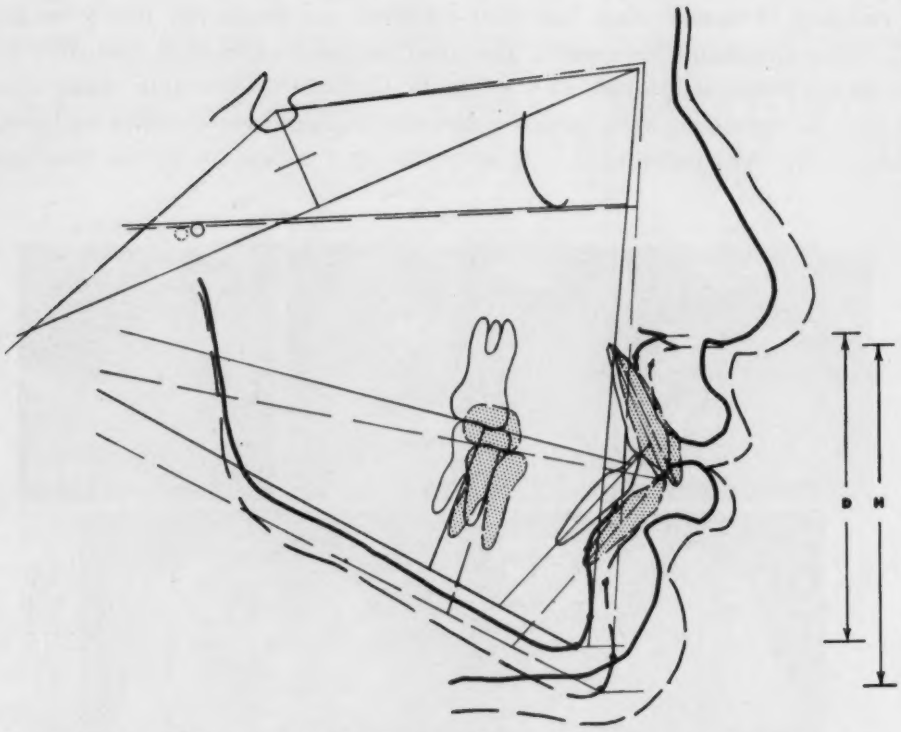


Fig. 16.—Case 5, Patient T. G. Superposed tracings of cephalometric roentgenograms. Solid line, September, 1950; broken line, February, 1953.

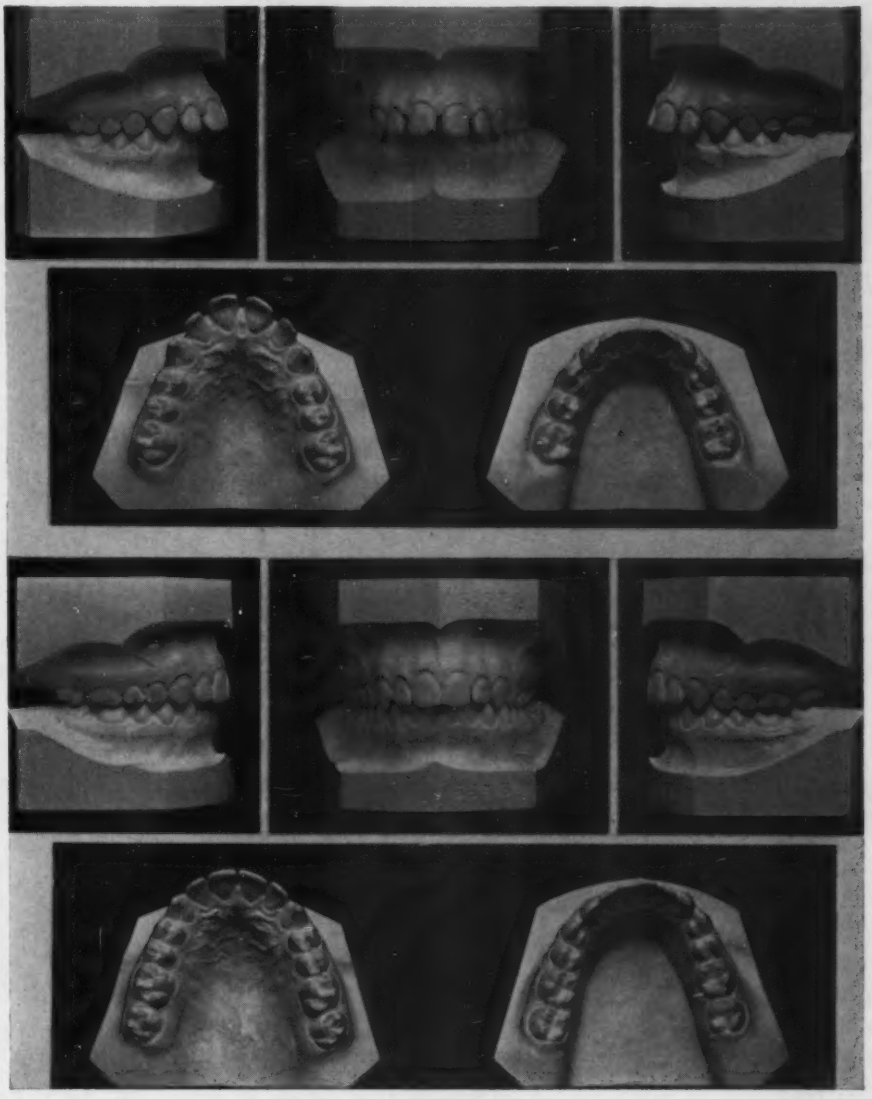
marked increase in denture height, a factor which, complemented by orthodontic therapy, as observed before, resulted in greatly improved function and esthetics. We will note that the $\lfloor \overline{1}$ to mandibular plane angle remained constant, but $\lfloor \overline{6}$ to mandibular plane angle was reduced 4 degrees by the action of the Class II elastics. This case has been observed, out of retention, for some time, and has been holding extremely well.

TABLE VI

CEPHALOMETRIC ANALYSIS CASE 6, PATIENT E. R.	SEPT., 1951	MAY, 1955	CHANGES	CONTROL GROUP (MEAN)
Facial angle	77	79	+2	85.33 (Reidel)
Angle SNA	81	81	0.0	80.79 (Reidel)
Angle SNB	77	77	0.0	78.02 (Reidel)
Difference	4	4		+2.77 (Reidel)
Angle of convexity	3	2	−1	+4.22 (Reidel)
Mandibular plane angle	33	34	+1	27.06 (Reidel)
Y axis angle	69.5	68	−1.5	59.4 (Downs)
Angle $\lfloor \overline{1}$ to $\lfloor \overline{1}$	120	143	+23	130.40 (Reidel)
Angle $\lfloor \overline{1}$ to mandibular plane	90	91	+1	93.52 (Reidel)
Angle $\lfloor \overline{1}$ to occlusal plane	72	70	−2	71.79 (Reidel)
$\lfloor \overline{1}$ to facial plane	9 mm.	4 mm.	−5 mm.	6.35 mm. (Reidel)
Angle $\lfloor \overline{1}$ to NS	118	91	−27	103.54 (Reidel)
Cant of occlusal plane	14	16	+2	+9.3 (Downs)
Angle $\lfloor \overline{6}$ to mandibular plane	78.5	77	−1.5	
Denture height (ANS-GN)	56 mm.	63 mm.	+7 mm.	

Case 6, Patient E. R. (Figs. 17 and 18, Table VI), exhibited a backward divergent mandible; the facial angle was 77 degrees. There was a deep overbite and overjet, with wide spacing in the maxillary teeth from canine to canine and a fairly deep curve of Spee. Treatment was designed to level the occlusion

A.



B.

Fig. 17.—Case 6, Patient E. R., casts. *A*, Before treatment; *B*, after treatment.

and effectuate a reduction in the overbite and overjet. A Hawley bite plate was inserted and edgewise therapy later was instituted, again using a splint in the mandibular arch with Class II elasties. As in the previous case, there has been good over-all growth, with that in the mandible being relatively

greater in a forward direction, contributing to a larger facial angle and improved esthetics. A reduction in the angle of convexity and an increase of the facial angle may be indicative of the fact that there also may have been some degree of change in mandibular posture. There has been a 1 degree forward movement of angle $\lfloor \overline{1}$ to the mandibular plane, which we suspect was due to the fact that the youngster was not completely cooperative and may have worn elastics at times without the splint. At any rate, it has not militated against a successful functional and esthetic result. Angle $\lfloor \overline{6}$ to the mandibular plane here again has been reduced, contributing toward opening of the bite, concomitant with the increased denture height due to the great increment on the lower border of the mandible.

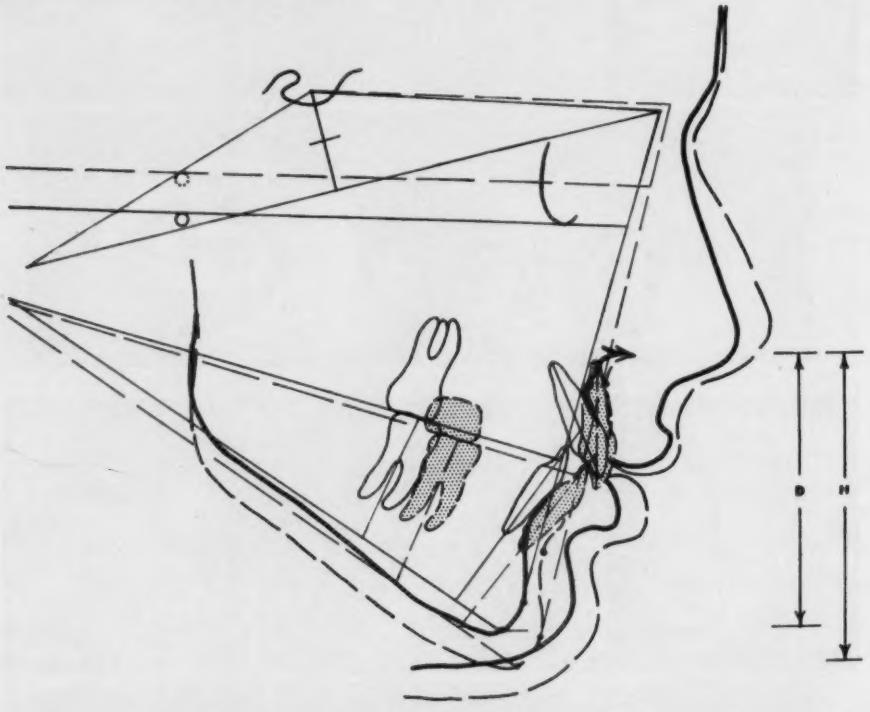


Fig. 18.—Case 6, Patient E. R. Superposed tracings of cephalometric roentgenograms. Solid line, September, 1951; broken line, May, 1955.

In the foregoing case analyses an attempt has been made to delineate the changes occurring in successfully treated cases of varying types, in which tissue- and tooth-borne anchorage had been employed for intermaxillary elastic traction. Over a period of the past five or six years many more cases, of course, have been so treated. A statistical analysis of this series of cases will be presented at a future date.

INTRAMAXILLARY ANCHORAGE

There is still another aspect of treatment in which appliances of this type have been found most efficacious, namely, intramaxillary anchorage. Fig. 19 demonstrates the use of such an appliance in an essentially "good" lower jaw in which removal of the second premolars was considered necessary for successful treatment. The first molars were brought forward by buccal and lingual

elastic traction. It should be noted that the directional pull of the elasties is such that the appliance will be held in position while the molars are brought forward and upward; it is, in fact, a mild Class II action, achieved by judicious placement of the hooks on the appliance and the molar bands.

Fig. 19.

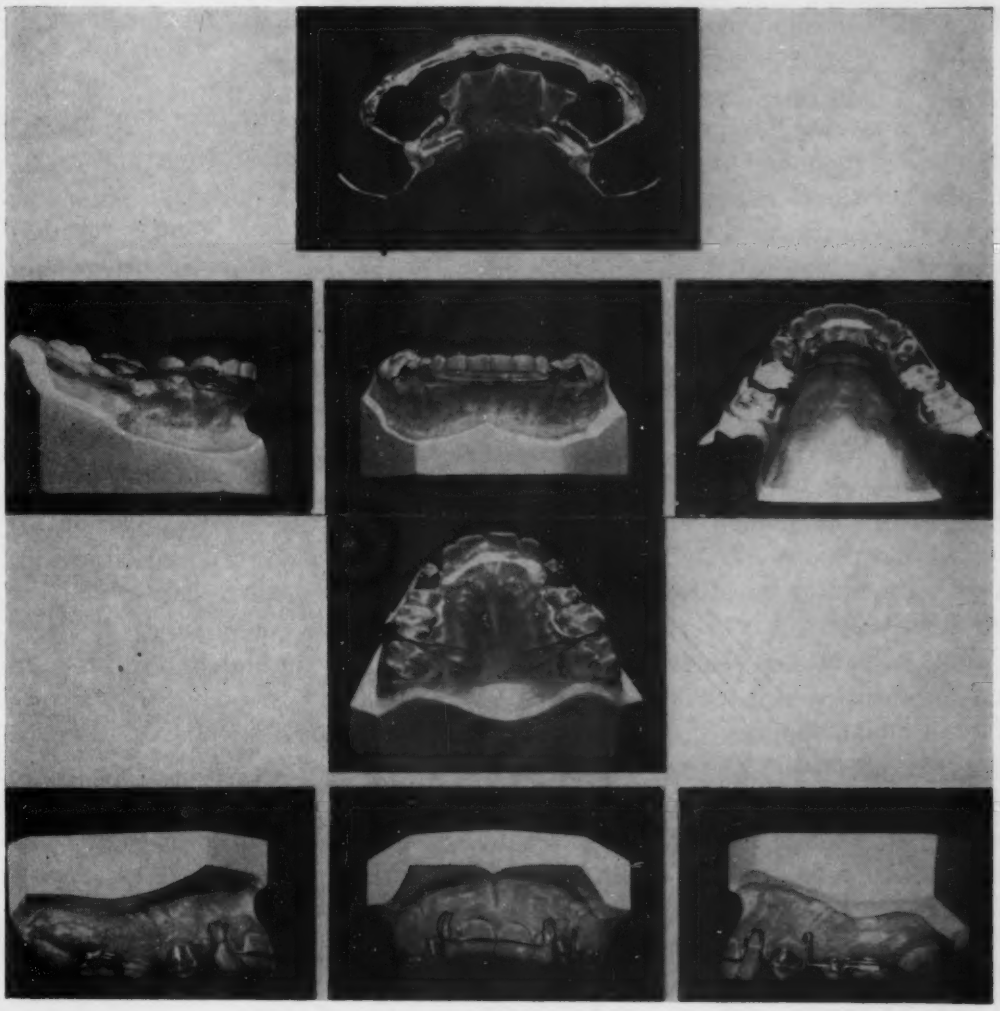


Fig. 20.

Fig. 19.—Above, appliance used to provide tissue- and tooth-borne anchorage for the mesial movement of the mandibular first molars. Below, appliance on model, showing position of hooks for proper elastic traction. Left, right side, with elastic; center, front view; right, lingual view, showing coverage of teeth and tissue, with elastics.

Fig. 20.—Hawley bite plate on model, with 0.026 spurs mesial to the second premolars, utilizing the teeth and palate as anchorage for the distal movement of the canines (center). Left, latex elastic in position for initial retraction of canine; right, application of sectional edgewise arch with loop for retraction of canine, in which torque and antirotational adjustments may be made.

Fig. 20 shows a type of appliance used for stabilization of anchorage when retraction of the canines is required in the maxillary arch. It is simply a Hawley bite plate, with 0.026 inch spurs placed mesial to the second premolars. Used in this fashion, the buccal segments are held firmly, the palatal bone and

practically all the teeth in the arch being pitted as resistance for the movement required. Two methods are demonstrated; on the right, elastic traction is employed, a useful method, especially for initial movement in many cases wherein the canine is excessively mesially inclined, and on the left, in which the second premolar is also banded, a sectional rectangular arch is used. The latter, of course, has many adventages, particularly in that antirotational and torque forces may be employed safely and efficiently.

SUMMARY AND CONCLUSIONS

A study has been made with a view to testing the efficacy of removable appliances designed to utilize both bone and teeth for intraoral anchorage. Cephalometric roentgenology was employed to test both the stability of the anchorage and to analyze the totality of change occurring in several types of treated cases, most of them some time out of retention. Many other cases, unreported to date, testify to the stability of anchorage with this type of appliance. The application of tissue- and tooth-borne anchorage for intramaxillary traction was demonstrated. The findings seem to warrant the following conclusions:

1. The use of tissue- and tooth-borne appliances for elastic traction provides a remarkably stable anchorage. Cephalometric studies show that, when used in the mandibular arch, the position of the incisors is not adversely affected, but the mandibular first molars are repositioned upward and backward, thus contributing to greater denture height and consequently better function and facial esthetics in all cases with deep overbite.

2. In most cases, during the postretention period the incisor axes of both the teeth employed in anchorage and those of the opposite jaw showed tendencies for continual posterior positioning and bodily uprighting, confirming the findings of previous investigators.

3. Cephalometric analysis disclosed that there was considerable incremental growth in some cases and very little in others; in some, evidence of change in mandibular posture or spatial relationship relative to the face and head was found. In all cases, regardless of the pattern of growth or the therapeutic force employed in treatment, the anchorage remained stable with the use of the tissue- and tooth-borne appliance.

4. The types of appliance herein advocated may be employed therapeutically for both inter- and intramaxillary traction.

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165 NORTH VILLAGE AVE.

HISTORY OF THE AMERICAN BOARD OF ORTHODONTICS*

OREN A. OLIVER, D.D.S., LL.D.
NASHVILLE, TENN.

THE American Board of Orthodontics, the first dental board in this country, was brought into being largely through the efforts of Dr. Albert H. Ketcham. Dr. Ketcham was born in Vermont in 1870 and early in life developed an interest in dentistry because of his respect for his mother's brother, Dr. W. H. Wright of Brandon, Vermont, who was a practicing dentist. Young Ketcham spent a year in Dr. Wright's office and then entered the Boston Dental College, from which he was graduated with a D.D.S. degree in 1892. He then accepted a position as clinical instructor in operative dentistry at his alma mater, in which position he continued until the fall of 1895. Because of illness, he was forced to retire and move to Colorado Springs, Colorado. Shortly after that he began the general practice of dentistry in Aspen, Colorado. From there he moved to Meeker, Colorado, and in the fall of 1897 he accepted a position in the infirmary of the University of Denver Dental Department. The following year he engaged in general practice in addition to his work as an instructor in crown and bridge and orthodontics.

He met Dr. Edward H. Angle at the annual convention of the Colorado State Dental Association, of which he was a member, and was inspired by Dr. Angle to specialize in orthodontics. He attended the Angle School of Orthodontia in St. Louis, Missouri, in 1902. In the practice of orthodontics he was eminently successful and very soon established for himself a reputation for skill, thoroughness, and interest in his patients. It was thus that Dr. Ketcham was a pioneer in every movement for the improvement and advancement of the specialty of orthodontics. It is not surprising, therefore, that we find this man who served as president of the American Association of Orthodontists during the year 1929 advancing the idea that an American Board of Orthodontics should be organized for the purpose of examining and granting certificates of competence to successful candidates. Dr. Ketcham believed that such a board would have much influence in improving orthodontics and could promote skill and efficiency in this special branch of dentistry better than any state legislation or better than any plan promoted by universities or college professors or deans.

In his presidential address to the American Association of Orthodontists, which held its annual meeting at Estes Park, Colorado, in July, 1929, Dr. Ketcham suggested the formation of such a board. In this address Dr. Ketcham

*In 1939 the name was changed from The American Board of Orthodontia to The American Board of Orthodontics. The A.A.O. adopted *orthodontics* as the official term, which was later adopted by the American Dental Association and *Gould's Medical Dictionary*.

recommended the creation of the American Board of Orthodontics, following the plan to be submitted by the Committee on Education through its chairman, Dr. Oren A. Oliver. He urged that this Board be empowered to examine applicants and to issue certificates of fitness to those found proficient in the specialty.

Dr. Ketcham's views on the formation of such a board and the purposes and aims of such a board were influenced by his association with outstanding medical colleagues in Denver. One of his close friends in Denver was Dr. Edward Jackson, who was a member of the American Board of Ophthalmology. This board was the first medical certifying board. In fact, it was the first step toward standardization of medical specialties in the world.

Another close friend of Dr. Ketcham was Thomas Carmody, D.D.S., M.D., an ear, nose, and throat specialist practicing in Denver. He formerly had practiced dentistry and had shared an office with Dr. Ketcham. Dr. Carmody was a member of the first certifying board of otolaryngology. This was the second medical board to be organized in the United States. Since both Dr. Jackson and Dr. Carmody were close friends of Dr. Ketcham, he conferred with them frequently during the formation of the American Board of Orthodontics. Dr. Ketcham carefully studied the constitution and bylaws of both of these medical specialty boards. In his presidential address at Estes Park, Dr. Albert H. Ketcham stated, "Our Education Committee has outlined a plan for the creation of an American Board of Orthodontics which shall examine applicants and, if they are found proficient, issue a certificate of fitness. This plan is patterned after the American Board of Otolaryngology and the American Board of Ophthalmic Examinations, which have been found to be successful, each filling a need in its respective field."

An important step in the creation of The American Board of Orthodontics was the appointment of a committee, headed by Martin Dewey, D.D.S., M.D., to consider President Ketcham's address. This committee presented the following resolution, which was adopted unanimously: "Whereas, the President has recommended the formation of an American Board of Orthodontics similar to the American Board of Otolaryngology and other similar boards formed for the purpose of regulating the specialties of medicine, which boards have rendered valuable service in standardizing and increasing the efficiency of medical specialists; and

"Whereas, up to this time those engaged in the practice of orthodontics have had varying and sometimes insufficient qualifications for the practice of our specialty; and

"Whereas, the need of a high order of training is essential to orthodontic practice; and

"Whereas, there is need of a body to designate standards of study and other qualifications for those who are to represent the specialty of Orthodontics; be it therefore

"RESOLVED: That the American Society of Orthodontists create and sponsor an organization to be known as The American Board of Orthodontics,

which shall consist of seven men of unquestionable and outstanding reputation and accomplishment in the science of Orthodontics, who shall be appointed by the Executive Committee and elected by the general assembly at large—one to serve for a period of one year, one to serve for a period of two years, one to serve for a period of three years, one to serve for a period of four years, one to serve for a period of five years, one to serve for a period of six years, and one to serve for a period of seven years; and one to be elected annually thereafter to serve for a period of seven years. The nominations made by the Executive Committee shall not be voted upon until the following day thereafter. Three-fourths of the votes cast shall be necessary to elect a nominee a member of The American Board of Orthodontics.

"The Board shall organize and make rules regarding the requirements for examination of candidates for the granting of certificates of fitness, and to make such other rules and regulations as it may deem necessary for the proper functioning of the Board."

Following the adoption of this resolution the Executive Committee of the American Association of Orthodontists presented nominations for the Board as provided in the resolution. On the following day election of members to the Board took place. The following seven men were elected to the first Board: Albert H. Ketcham, 1930-1935; Oren A. Oliver, 1930-1936; B. Frank Gray, 1930-1938; Abram Hoffman, 1930-1935; Martin Dewey, 1930-1932; Lloyd S. Lourie, 1930; and Alfred P. Rogers, 1930. Following the election, the members of The American Board of Orthodontics met and elected Albert H. Ketcham president and Dr. B. Frank Gray secretary.

The first meeting of the Board was held at the Stevens Hotel in Chicago on Jan. 13, 1930. At this Chicago meeting it was decided that the Board should be incorporated under the laws of the state of Illinois. A motion was made by Dr. Dewey that the Board incorporate, the motion was seconded by Dr. Hoffman. The motion to incorporate under the laws of the state of Illinois was then made by Dr. Oren A. Oliver; this motion also was seconded by Dr. Hoffman.

At this first regular meeting considerable time was devoted to a discussion of the articles of incorporation and to a consideration of the constitution and bylaws. Also the form of application blank was considered, and considerable discussion was devoted to the preparation of a prospectus or bulletin to be issued by the Board, setting forth the rules governing the Board's activities. The Board decided that 1,000 copies of this prospectus should be printed and that a supply of application blanks should be made available for applicants.

In addition to the matter of incorporation and financial policy and routine matters of printing a prospectus and application blanks, considerable time was devoted to a discussion of policies of the Board. It was pointed out by several members of the Board that the Board's first duty was to establish a standard of fitness and then to consider the examination of candidates. Some discussion centered around the question of whether sectional orthodontic societies should be represented on the Board instead of just members of the American Society of Orthodontists.

To facilitate the Board's work in the consideration of applicants, it was suggested that applicants be classified into three groups, according to the length of service in the profession. The three groups were those with fifteen years', seven years', and three years' practice.

It was decided at this meeting that the application fee for candidates should be $50.00. However, since at this time no applications had been received, there was as yet no money in the treasury. This led Dr. Oren Oliver to move that each member of the Board be asked to lend the Board $50.00 until such time as the Board had sufficient funds to refund same. The motion was seconded by Dr. Dewey, and carried. Later the members of the Board received a refund of the amount loaned.

In its effort to strive toward high standards, the Board decided that it would be fitting that it first certify, upon application, those outstanding practitioners of orthodontics whose professional record (not reputation alone) would equal or exceed the maximum examination that might be required by the Board to establish a standard of fitness. The Board further decided that the following requirements should be demanded of all applicants:

1. High ethical and orthodontic standards in their communities, together with a dental degree satisfactory to the Board.
2. Formal application on an official blank, with letters of endorsement by two well-known orthodontists.
3. Case histories and other evidence of proficiency may be required at the discretion of the Board.

The Board decided that it might also require case reports in cases in which sufficient time had elapsed since the period of active and postoperative treatment to show the extent of relapse, if any. The Board emphasized the fact that its aim should be sufficiently broadminded to avoid unduly exacting standards on the one hand and, on the other hand, a laxity which would defeat the purpose for which the Board had been constituted.

Soon after the creation of the Board, much interest in it was manifested, as shown by the large number of applicants who were interested in securing certificates. It is interesting to note, too, that among the applicants who filed early appeared the names of many eminent practitioners. The Board specified that any person who made application for a certificate should be in the exclusive practice of orthodontia in his own name.

One of the Board's first decisions, however, was that no certificate of fitness may be issued by the Board to a member of the Board until his term on the Board had expired. Thus, members of the Board were not eligible to receive the certificate while actually serving on the Board.

The second meeting of The American Board of Orthodontics was held in Nashville, Tennessee, on April 7, 1930. At this meeting Drs. Dewey and Rogers were absent, and Dr. Alfred P. Rogers felt obliged to present his resignation, which was accepted.

At this second meeting the Board decided that the following orthodontists had met the requirements of the American Board of Orthodontics and accordingly issued to them certificates of qualification:

Ernest N. Bach
Charles R. Baker
Oscar Carrabine†
Frank M. Casto
Albert W. Crosby†
Frank A. Delabarre†
William E. Flesher
Jacob A. Gorman
Henry F. Hoffman
Harry L. Hosmer
Clinton C. Howard†
William R. Humphrey
Bernard L. Hyams
Harry E. Kelsey†
B. E. Lischer
John V. Mershon†
Harry L. Morehouse
Frederick T. Murlless, Jr.†
James D. McCoy
Herbert A. Pullen†
Alfred P. Rogers
Harvey A. Stryker
Allen H. Suggett†
Leuman M. Waugh
B. W. Weinberger
Oliver W. White
Raymond C. Willett†
J. Lowe Young†

Throughout the years the Board continued its efforts to promote high standards of excellence in the practice of orthodontics. The Board, however, does not purport to confer upon any person any legal qualification, privilege, or license to practice orthodontics, nor does it intend to limit the activities of any licensed dentist.

The purposes of the Board have been stated as follows:

"First. To stimulate and keep alive the spirit of research and self-improvement among students and practitioners of orthodontics.

"Second. To establish the competence of specialists to practice orthodontics.

"Third. To arrange, control and conduct examinations for the purpose of testing the qualifications of orthodontists and to confer certificates upon those who meet the established requirements of the Board."

In 1950 the Board decided that the "rules and regulations directing the operations of The American Board of Orthodontics are based upon the Requirements of Approval of the Council on Dental Education of The American Dental Association."

In 1953 the Board decided that it will no longer be possible to waive examination and certify candidates on their records.

Examination of candidates for certificates may include any or all of the following:

"One or more theses on subjects satisfactory to the Board.

Case reports, to be prepared according to an outline furnished by the Board.

Sets of casts fitted with appliances suitable for treatment of the cases shown.

†Deceased.

Personal visits to offices of applicants.

Written or oral examinations.

Clinical presentations.

Laboratory and technic examinations."

The Board holds an annual meeting, immediately preceding the annual convention of the American Association of Orthodontists.

Throughout its history, from 1930-1956, the Board has issued 514 certificates of fitness. The geographical distribution is as follows: Alabama, 2; Arkansas, 2; Arizona, 4; California, 60; Colorado, 9; Connecticut, 12; Delaware, 3; District of Columbia, 10; Florida, 7; Georgia, 4; Illinois, 34; Indiana, 3; Iowa, 5; Kansas, 3; Kentucky, 3; Louisiana, 3; Maryland, 6; Massachusetts, 16; Michigan, 19; Minnesota, 11; Missouri, 17; Montana, 1; Nebraska, 5; New Jersey, 24; New York, 95; North Carolina, 5; North Dakota, 1; Ohio, 24; Oklahoma, 6; Oregon, 7; Pennsylvania, 31; Rhode Island, 2; South Carolina, 1; Tennessee, 8; Texas, 22; Utah, 1; Virginia, 6; Washington, 14; West Virginia, 1; Wisconsin, 9; Wyoming, 1; Canal Zone, 1; and Canada, 16.

The value of the certificate issued by the Board consists primarily of establishing in the mind of the holder the assurance that he is maintaining accredited standards of competency in his practice. The certificate also establishes definite standards of fitness to those anticipating specialization in orthodontics and serves as a stimulus to desire and obtain such a certificate as recognition of their ability.

1915 Broadway.

Orthodontic Profiles

ALLEN HOLMAN SUGGETT

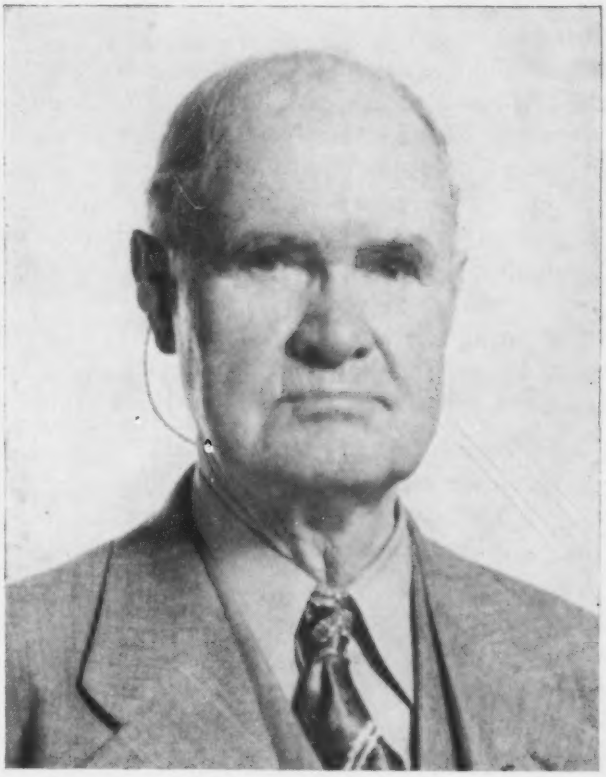
ALLEN HOLMAN SUGGETT, one of the most colorful figures, as well as one of the pioneer orthodontists, of the Pacific Coast was born on a farm in Middletown, Missouri, on April 15, 1867. He was one of sixteen children, all of whom lived to maturity except one who died in infancy.

When he was but 8 years of age, his family felt the lure of California where they had relatives already established, so they decided to move West. In those days of early railroading, it took eight days to travel from the Missouri River to Sacramento. All male passengers carried arms, not for protection but for shooting at such game as prairie dogs, rabbits, and an occasional antelope. The train rarely traveled more than twenty miles an hour and frequent stops were indulged in so that traffic going in the opposite direction could pass. During these intervals the men disembarked to indulge in gun practice. When ready to move again, the engineer blew three toots upon his whistle and everybody came aboard. Such things went on only during fair weather, for in winter the windows had to be kept closed to keep out the cold.

The Suggett family settled on a ranch near College City in northern California and the male members of the family sought employment on adjacent ranches when they were not needed at home. The College was one of the few institutions of higher learning north of Sacramento and Allen Holman Suggett eventually graduated from it. He was always a great believer in higher education and his ideals along this line were carried into his profession when he decided to become a dentist. In those days there was but one school of dentistry in California, so that most of those ambitious to become dentists received their instruction in the office of a preceptor. Dr. Suggett followed this plan and went into the office of a dentist in Eureka, California, where he spent several years. However, he felt the need of more complete training so he went to San Francisco and enrolled in the School of Dentistry of the University of California, where he graduated in 1893. He then moved to the city of Marysville, California, a prosperous mining and ranching community north of Sacramento where he continued in the practice of general dentistry for several years. While there he married Clara Lipp, but within a few years she became ill and passed away. After a period of some time, he met and married Louise Steffens, one of the sisters of Lincoln Steffens, a brilliant journalist who had become famous in exposing the corruption present among political bosses. The Steffens family was a wealthy one and their home in Sacramento was afterward sold to the state of California to be used as the executive mansion.

Dr. and Mrs. Suggett then moved to San Francisco, where they established a home, and Lincoln Steffens and his sister Laura came to live with them. Laura Steffens was a professional librarian and, in conjunction with James Gillis and Miss Harriet G. Eddy, was enabled to put into effect the library system still in vogue in the state of California.

Allen Suggett became interested in orthodontics and in 1908 started limiting his practice to this branch of dentistry. At this time he was made professor of orthodontics at the School of Dentistry at the University of California and continued in this position for a number of years.



ALLEN HOLMAN SUGGETT

The sudden illness of his wife, Louise, and her early death broke up the happy combination in his home, but not too long after her passing he married Laura Steffens, the librarian. Lincoln Steffens always made his home with them while he was on the Pacific Coast, and it was always a rendezvous for the intellectuals of the Bay Region. Lincoln Steffens, who was very devoted to Allen Suggett, used to introduce him as "the man that married most of my family." In 1906 Dr. and Mrs. Suggett took a trip around the world which proved to be a very colorful and educational experience, as they were both interested in the forms of government in different parts of the world. Upon their return from their world trip Dr. Suggett re-entered the practice of orthodontics and also

his teaching position at the University of California. This was interrupted, however, by the severe illness of his wife, Laura, who became mentally ill and required hospitalization and expert care. While she was under medical care in New York City, Dr. Suggett taught for six years at the School of Dentistry at Columbia University, without salary, his special field being orthodontic diagnosis. He was especially qualified in this for he had been one of those responsible for bringing Dr. Paul Simon of Berlin to this country to introduce gnathostatics into the dental curriculum. In 1946 Dr. and Mrs. Suggett returned to San Francisco where she passed away. Following her death he did not re-enter practice but retired and went to live in Santa Barbara, California. Until the very hour of his death his brilliant mind remained clear and his wonderful sense of humor active.

Always interested in Dental and Orthodontic organizations, Dr. Suggett served as President of the Pacific Coast Society of Orthodontists during 1923 and 1924. He was always a great believer in making young orthodontists welcome at meetings, even though they had not been in the exclusive practice long enough to qualify for regular membership. This started the movement which eventually crystallized into what we now have as associate memberships. Always a great believer in higher education, he assisted many young people to attain a college education.

During his lifetime, and he would have been 88 had he lived another month, his warm friendship meant much to many people. The poet Longfellow offered a tribute to such men as Allen Holman Suggett when he said:

Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time.

—*James D. Mc Coy.*

In Memoriam

OSCAR JACOBSON
1906-1956

MEMBERS of the Northeastern Society of Orthodontists were shocked and grieved to learn of the sudden death of their president, Oscar Jacobson, on Nov. 25, 1956. Dr. Jacobson died, after a brief illness, at his home in New York City.

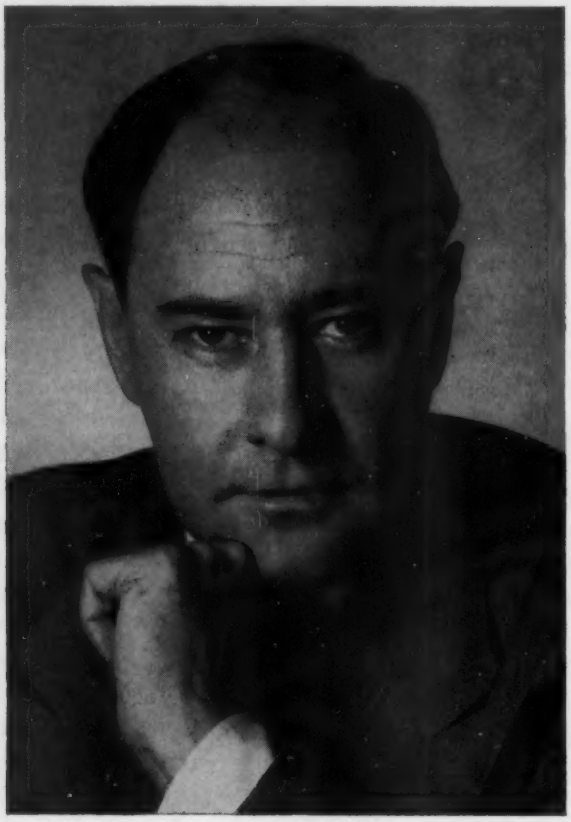
Dr. Jacobson was born in New York City on Feb. 25, 1906, the son of Samuel and Sophie Jacobson (nee Fiel). He obtained his early education in the public schools of New York City and at New York University. While still a young man, Dr. Jacobson became interested in the profession of dentistry and entered New York University College of Dentistry, from which institution he received a D.D.S. degree in 1928. Immediately after graduation he became associated with Dr. Arthur V. Greenstein, an orthodontist, with whom he worked until 1934, when he opened his own office.

Early in his career, Dr. Jacobson became actively interested in organized dentistry. He was a past-president of the First District Dental Society, and over a long period served as chairman and/or member of many important committees for state and local dental societies, including the Dental Society of the State of New York where he served recently on the Board of Governors. He was chief of the Department of Orthodontics at Midtown Hospital, New York City, and consultant on orthodontics for the Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn, New York. He was a member of the Orthodontic Advisory Committee to the Bureau of Dentistry of the State Department of Health, a member of the American Association of Orthodontists, and a diplomate of the American Board of Orthodontics. Dr. Jacobson was a member of Sigma Epsilon Delta fraternity and a Fellow of the American College of Dentists and many other organizations. He was author of numerous articles which appeared in leading dental journals. He was also city-wide chairman of the Dental Division of the United Jewish Appeal.

Dr. Jacobson had cultural affability and an impressive and attractive dignity of manner which won for him innumerable friends. His charming personality, his personal magnetism, his courage in defending that which he conceived to be right, his just and fair dealing, and his untiring efforts to advance dentistry are but a few of the many virtues that adorned his noble character. In his connection with organizational work, and in every other walk of life, he was known for his prudence, gentleness, caution, and justice. He had

the faculty for reconciling conflicting interests and bringing harmony out of discord. Unassuming, retiring in his manner, but most companionable, he was a most loyal and true friend.

Dr. Jacobson was married on Feb. 12, 1930, to Miss Helen V. Fox of New York City. His private life was filled with an expression of beauty, for he was a devoted husband and father. He is survived by his widow; a daughter, Maxine; his mother, Mrs. Sophie Jacobson Greenberg; and a sister, Mrs. Anna Jacobson Hockroth.



OSCAR JACOBSON

His friendship was a benediction that will endure throughout the lives of those who knew him. His benefactions will be remembered long after his friends have joined him.

RESOLVED: That this Society place on record its appreciation of his services and express its sorrow in the great loss sustained, and be it further

RESOLVED: That a copy of these resolutions be forwarded to the bereaved family as evidence of our sympathy and a copy be spread in the minutes of our Society.

—*John H. Madden.*

Department of Orthodontic Abstracts and Reviews

Edited by
DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

A Syllabus in Roentgenographic Cephalometry. By Wilton Marion Krogman, Ph.D., LL.D., Professor of Physical Anthropology, Graduate School of Medicine, University of Pennsylvania, and Director, Philadelphia Center for Research in Child Growth, and Viken Sassouni, D.P.F.P., M.A.Sc. (Dent.), Research Associate in Orthodontics, Graduate School of Medicine, University of Pennsylvania and Philadelphia Center for Research in Child Growth. Dr. W. M. Krogman, Philadelphia Center for Research in Child Growth, 1701½ Fitzwater St., Philadelphia 46, Pennsylvania. Copyright, 1957. Illustrated. 363 pages. Price, $12.50.

The authors have bravely faced the formidable task of taking inventory of the field of roentgenographic cephalometry and have brought off a tour de force. They cite as an "immediate cause" for the preparation of the syllabus the "Cephalometric Workshop" held at Western Reserve University in Cleveland in March, 1957. The workshop was sponsored by the American Association of Orthodontists in order that a group of competent authorities might set forth their views on how cephalometry can assist the orthodontist in his dual role of clinician and student of growth. However useful the syllabus may have been in these deliberations, its wider usefulness will be apparent to the reader on even a casual perusal.

The authors are thoroughly grounded in physical anthropology and are thus capable of showing the special field of cephalometry in proper perspective. This leads logically into a consideration of norms and standards, including a brief but lucid discussion of statistics. There follow two chapters, totaling 77 pages, which deal with techniques, landmarks, planes of orientation—what one sees in lateral and posteroanterior films and how best to trace and measure them intelligently.

Another extensive chapter deals with collateral research as seen by students of evolution, comparative anatomy, race, and endocrinology and by devotees of the experimental method. Excerpts from the literature are skillfully presented to contrast different points of view on the timeless discussion of "nature versus nurture," and the chapter concludes with clinical entities which have been studied by means of cephalometry.

Teachers should applaud the manner in which the authors handle the literature. They convey the sense of the original author, and in many instances quote generously from his writings, but they never eviscerate the original work to provide a pat summarization. Rather than making one feel that having Krogman and Sassouni in his study absolves him from reading the literature, they adroitly convey the impression that rich rewards await those who read.

Ardent followers of one particular system of cephalometric analysis may be dismayed to discover in an important section of this syllabus that it is but one of seventy such systems. Each of these seventy methods is concisely set forth, shortcomings are commented upon, and the reader gets a clear picture of what each one offers. By applying each system to one person, as the authors have done, they achieve a thought-provoking and practical means of comparison of analyses.

The text is written in a lively style, completely free of the turgid jargon which some authors identify with scientific probity. But praise must go not only to the authors; the typing has been done with commendable accuracy and some expert in modern lithography has done complete justice to the typing and to the many illustrations (tables and figures) taken directly from the original references. The work is bound, in loose-leaf form with a sturdy cover and large rings which make it a pleasure to turn rapidly from one section to another, as one is wont to do when ferreting out specific things.

There are twenty-one pages of bibliography alone, in itself a considerable service to the reader.

Finally, there are three sheets in the back, printed on heavy stock, which may be cut out and assembled into a three-dimensional model. One sheet constitutes a base on which are listed the standard cephalometric landmarks with reference symbols. The other two sheets are to be cut out and mounted at right angles to one another on the base. When completed, it affords a view of (1) a lateral film, (2) a lateral tracing, (3) a posteroanterior tracing, (4) one-half of a posteroanterior film, and (5) one-half of a frontal photograph.

In the opinion of the reviewer, every orthodontist owes himself the examination of this contribution to the professional literature. Few who examine it will be able to deny themselves the privilege of ownership. The authors have made the syllabus available on a nonprofit basis. It costs $12.50, and may be obtained from Dr. W. M. Krogman, Philadelphia Center for Research in Child Growth, 1701½ Fitzwater St., Philadelphia 46, Pennsylvania.

Wendell L. Wylie.

Congenital Dental Anomalies Occurring in 3,557 Children. By John M. Clayton. *J. Dent. Child.* **23**: 206-218, 1956.

There were 3,557 patients surveyed over a twelve-year period. The cases were not selected. Each patient received full-mouth intraoral roentgenograms consisting of four posterior and two anterior films. These films were examined and the occurrence of each anomaly was recorded. Special attention was given to the presence of supernumerary teeth, peg teeth, missing teeth, and fused or germinated teeth.

The data collected from 3,557 full-mouth roentgenograms revealed that 214 children had congenitally missing teeth, sixty-eight had supernumerary teeth with twenty-two in the primary dentitions, seventeen had fused teeth, and twelve children had peg teeth.

There was a total of 433 missing teeth (12.14 per cent) in the group of 3,557 boys and girls. The occurrence by sex was almost evenly distributed. The number of children with one or more missing teeth was 214 (6.01 per cent). There were eighty-two for the 3- to 5-year-old group, eighty-six for the 6- to 8-year-old group, thirty-four for the 9- to 11-year-old group, and twelve for those over 12 years of age.

The most frequently missing permanent tooth in this group was the mandibular second premolar, followed by the maxillary lateral and central incisors.

The most frequently missing primary tooth was the maxillary lateral incisor, followed by the central incisor and first primary molar. In instances where more than one tooth was absent there was usually a bilateral occurrence.

This group of children had a total of eighty supernumerary teeth. Fifty occurred in boys and thirty in the girls, for a percentage of 2.9 and 1.5, respectively. Aberrant teeth were more frequently seen in children under 8 years of age.

Fused and peg teeth presented a small minority of tooth abnormalities, and are thus discussed together. There were seventeen (0.47 per cent) germinated teeth in the total child population. Fused teeth were more commonly found in the 3- to 5-year age group and were about equally distributed between boys and girls. Peg teeth showed no distinction as to age or sex, with a total of twelve (0.33 per cent) such teeth in this group.

The most frequently missing teeth in this series were the mandibular second premolars and the maxillary lateral incisors. Peg teeth were found only in the permanent teeth and occurred in both right and left maxillary lateral incisors. Supernumerary teeth were found to occur about twice as often in permanent teeth as in the primary teeth. Fused teeth usually occurred as a singular anomaly in this group of children.

Tooth Contact During Chewing. By D. J. Anderson and D. C. A. Picton, Guy's Hospital, London, England. *J. D. Res.* **36**: 21-26, February, 1957.

Justification for the treatment of occlusal equilibration is based on the assumption that the teeth come into centric occlusal contact during chewing. If this occurs and if the occlusion is normal, the masticatory loads are distributed (not necessarily equally) throughout the whole dental arch. If the teeth do not come into contact during chewing, but remain separated by food, then occlusal equilibration seems to be justified only in gross malposition of the teeth or in persons who indulge in bruxism.

Experiments were designed to investigate the frequency of tooth contact in the natural dentition during chewing. Ten male subjects ranging between 20 and 34 years of age provided the experimental data. All except one were student volunteers who were not chosen on the basis of their dental condition; the only requirement was the presence of amalgam restorations in one pair of opposing posterior teeth. In all cases the dentition was complete, or nearly so.

The object of the experiments reported was to determine the frequency of contact between the dental arches during chewing, contact being registered with the teeth in centric occlusion. The wire used to complete the electrical circuit between the opposing teeth was approximately 0.5 mm. in diameter and in all cases the smallest possible voluntary gliding movement with the teeth in contact broke the circuit. In the empty mouth the method therefore records centric occlusal contact and an extremely narrow range of gliding movements out of centric occlusion.

During chewing, the food was on the side opposite that used for recording contact, and it is therefore possible that the teeth may have been separated by food on one side while coming into contact on the other. This is considered unlikely for several reasons. Attempts by the subjects to break the electrical contact while keeping the teeth together on the other side always failed. This shows that the jaws are not easily tilted. In some of the subjects, separation of the teeth on the chewing side with paper 0.0015 inch thick broke the contact on the other side, while in others paper twice as thick was necessary. This shows that, although tilting can occur, it is only very slight. If it is conceded

that contact can be recorded on one side while the other side is slightly separated, then during chewing this separation would have to be maintained in spite of the fact that the main muscular effort tended to overcome it. It seems unlikely that any of the food materials used in this investigation, except biscuit, could be capable of this.

In view of the surprisingly high frequency of contact shown by most subjects, the teeth were examined for evidence of wear. This was most marked in Subject 1 who made contact on every thrust with all the foods except biscuit. This subject, aged 34, was approximately 12 years older than the others. Signs of considerable wear were seen in all the teeth, even the third molars, and the facets suggested that he indulged in nonfunctional grinding of the teeth. Most of the other subjects showed some attrition but it was not possible to grade it accurately. None of the subjects showed any gross orthodontic abnormalities, the occlusion conforming with Angle's Class I, or in some cases showing a tendency toward Class II or III. Subject 9, who brought his teeth into contact most infrequently of all the subjects, showed a considerable incisor overbite, the lower incisors touching the palate, having drifted back following the loss of $\overline{6|6}$. The upper incisors just came into contact with the gingiva in front of the lower incisors. The subject was not conscious of this fact.

In most subjects contact was the least frequent with biscuit, none of them making contact on every thrust. With the other materials, most subjects brought their teeth into contact for more than one-half the thrusts, some for all the thrusts with every material. When contact occurred it was always more frequent toward the end of the chewing sequence. The means and standard deviations of the data for each subject were computed and are available from the authors.

Subject 6 executed many more chewing movements for every material than the other subjects. There was no gross dental abnormality which might account for this. His arches were complete, save for the loss of $\frac{}{5}|\frac{4}{}$, and the occlusion was only a mild example of Angle's Class II, Division 1.

The frequency of contact in this series is surprisingly high, and in only two of the subjects were consistently low values recorded with all materials. It is noteworthy that the duration of each contact increased toward the end of the chewing sequence.

SUMMARY

1. Contact between opposing teeth during chewing was recorded electrically in ten subjects with five food materials.

2. The results confirm the hitherto unsupported assumption by many periodontologists that the teeth make contact during chewing.

3. The teeth came into contact for more than one-half the chewing thrusts in most subjects. In some subjects every thrust made contact, but this was never the case with biscuit.

4. The results strongly suggest that when contact occurred it was centric occlusal contact over the entire arch.

News and Notes

Great Lakes Society of Orthodontists

The twenty-eighth annual meeting of the Great Lakes Society of Orthodontists will be held at the Hotel Statler, Detroit, Michigan, Oct. 20 through 23, 1957. Briefly, the program is as follows:

Essayists	*Title*
1. B. L. Herzberg	Matters Having to Do With the Tweed Teachings in Orthodontics.
2. B. L. Herzberg	The Treatment of Bi-Maxillary Protrusions According to Those Teachings.
3. Herbert Cooper	An Aid to Treatment Planning in Cleft Palate Cases.
4. Paul V. Reid	Extractions in the Borderline Case.
5. Byron Hughes	Dental Development and the Child as a Whole.
6. Paul V. Reid	Extractions in the Borderline Case: Case Reports.
7. William L. Wilson	The Use of Labial-Loop-Lingual Appliance in Different Types of Class II Cases.
8. William L. Wilson	The Use of Labial-Loop-Lingual Appliance in Deficiency Cases Where Extraction or Expansion Is Indicated.
9. M. C. Peterson	It's Later Than It Has Ever Been for Financial Security.

Orthodontists and students desiring to attend may make reservations directly through the Hotel Statler. Tickets for social functions may be procured from Dr. James Reynolds, Adrian, Michigan.

H. IRVING MILLER,
Program Chairman

Middle Atlantic Society of Orthodontists

The next annual meeting of the Middle Atlantic Society of Orthodontists will be held at the Warwick Hotel, Philadelphia, Pennsylvania, Oct. 20 through Oct. 22, 1957.

Northeastern Society of Orthodontists

The fall meeting of the Northeastern Society of Orthodontists will be held at the Hotel Statler, Buffalo, New York, Oct. 21 and 22, 1957.

Pacific Coast Society of Orthodontists

The twenty-fifth general meeting of the Pacific Coast Society of Orthodontists will be held Feb. 23 to 27, 1958, in Santa Barbara, California.

The Southern Section of the P.C.S.O., which will sponsor the affair, promises that the meeting will be be a gala occasion and that there will be a topnotch program featuring such names as Brodie, Straub, Ricketts, and many others. There will be many table clinics, seminar sessions, and essays. Other features will include a Spanish barbecue, entertainment, social events for men and women, and style shows.

More details will follow in subsequent issues of the JOURNAL.

Excerpts From The Bulletin of The Pacific Coast Society of Orthodontists

Northern Component

On Sunday evening, March 3, 1957, a cocktail party and banquet was held for the members, their wives, and their guests, the oral surgeons. We all had the pleasant opportunity of meeting Dr. and Mrs. Lyall Bishop of Walnut Creek, California. Entertainment was furnished by one of the local music companies, who demonstrated Steriophonic Sound for us—a new and interesting experience.

On Monday morning, March 4, 1957, the meeting began promptly, with Paul Lewis opening the scientific session with a paper on problems of retention as related to his new retention device, "The Labio-Buccal Retainer." This paper was profusely illustrated with slides and study models of several cases treated with this mechanism.

The second half of the scientific session was devoted to a paper by Lyall Bishop entitled "Surgical Aids in Orthodontic Treatment." This paper was supplemented by an excellent movie illustrating the various surgical procedures described.

The afternoon session was again given over to Lyall Bishop, who further discussed the problems presented by supernumerary teeth, impactions, and third molars. Again, his discussion was amply illustrated with slides and a short movie. This scientific program was one of the finest we have ever had and those present received a valuable store of knowledge that should eliminate a few of their orthodontic problems.

A short business meeting was held, at which the minutes of the previous meeting were read and approved.

The applications for active membership of W. B. Doering and R. Failor were read and approved, moved by E. A. Bishop, and seconded by George McCulloch. E. A. Bishop then administered the Pledge and Code of Ethics to E. Supernaw and J. Moran.

G. N. Dohner.

In Seattle, on Dec. 3, 1956, a joint meeting was held with pedodontists and oral surgeons from cities of the northwest area. An interesting program was arranged by Wayne Bolton and Dick Philbrick. This consisted of a series of three panel discussions moderated by pedodontist David Law, oral surgeon Tom McIntyre, and orthodontist Al Moore.

The purpose of the program was to provide a better understanding by the three groups of one another's problems in the preparation of a patient for orthodontic treatment.

Bob Kemp, Correspondent.

Central Component

Our March 11 meeting at the Fraternity Club was attended by fifty-one members and guests. The minutes of the December meeting were approved as published in the *Bulletin.*

Our program included the receiving of the Pledge of the Pacific Coast Society of Orthodontists by Drs. Lagier, Ponterio, Ray, Gillespie, and Marcus. It was administered to them by Frederick West, past-president of the A.A.O.

It was announced that Ed Tippett would be in charge of obtaining table clinics from this component for the meeting in Santa Barbara next February 23 to 27. Any members having material to present were encouraged to contact him. We are limited by space, so those who signify their intention of participating earliest will be given preference.

Program Chairman Bill Parker introduced the speaker of the evening, Mr. Raymond Selder, who discussed "Planning Your Future." His discussion included the pattern of estate planning in a logical manner so that needs at different age levels might be covered. He stressed the necessity of re-evaluation of the aims of any program at rather frequent intervals to follow our changing economic situations. The presentation was well received and was followed by a question period.

Eugene E. West.

Southern Component

The meeting was called to order by Chairman Roscoe Keedy on March 8 at 2:30 P.M. at the Huntington-Sheraton Hotel in Pasadena.

Bob Gawley introduced the speaker of the afternoon, Paul Lewis of Seattle, Washington, whose subject was "The Considerations of Retention."

During the afternoon and evening sessions, Dr. Lewis outlined the use of a very valuable appliance for the management of stubborn retention problems and suggested that prolonged retention is also part of the retention answer.

Dal McCauley, chairman of the twenty-fifth annual meeting, gave an interesting progress report relative to this meeting in Santa Barbara.

The following active members were introduced and given the Pledge and the Code of Ethics:

Allen E. Hom	Franklyn C. Nelson
Donald C. Noy	Norton J. Wood
Joseph Raskin	Lawrence G. Osborne

William F. Cagle is also a new active member and will be introduced at a later date.

Fred McIntosh reported on and discussed the problem of preceptorships. A lively and serious discussion by various members shed considerable light and information on the subject. Concern was expressed over the possibility of preceptorships which might develop into almost exclusive mechanical training.

It was moved by Bob Gawley, seconded by Sydney Cross, and passed unanimously that: the delegate of the Pacific Coast Society of Orthodontists—Southern Component—be instructed to recommend the change of the former resolution to permit adequately controlled preceptorships, which will include basic science courses, with possible examination in the theory courses.

An excellent dinner was served, following a very pleasant social hour. After dinner, Paul Lewis continued his presentation of retention problems.

Charles D. Linfesty, Secretary.

California Crippled Children Service

An outline of the manner in which this program has been handled in Los Angeles County for the past twenty years is submitted by Dr. Fred McIntosh.

There is an office in the L. A. County General Hospital to which anyone can refer a child under 21 years of age for consultation. The Dental Attending Staff at the hospital takes a full set of x-rays, and the child is given an appointment to appear before the Orthodontic Consulting Staff. One afternoon a month is devoted to these examinations.

One younger orthodontist serves with one more experienced member on an examining team. All must be members of the orthodontic society. A man must make formal application for membership on the staff, and appear for examination before the orthodontic staff.

At the beginning of each year, the agency is sent four copies of the membership of the Southern Component Society—active and associate members. Cases that have been certified for treatment are referred alphabetically from this list to the members in the home area of the patient. This distributes the cases in a uniform manner, and no one is asked or allowed to handle more than two to four cases each year.

If a case is approved for treatment by the orthodontic examining committee, the records are returned to the Program Office for processing by the Social Service Department of the County. If approved, the case is then referred to the orthodontist, to see if he wishes to take the case. The director of the Physically Handicapped Children's Program is then notified of the decision and if treatment is to be undertaken, an estimate of time needed is made.

The orthodontist is authorized to provide the required service for one year. If additional time is needed and if the case is being treated in a satisfactory manner, this additional time is authorized as long as the parent remains unable to pay for private care for a maximum of four years.

Announcements

W. Mahlon Adams announced the removal of his office from 14417 Hamlin St. to 6902 Van Nuys Blvd., Suite B, Van Nuys, California.

J. V. Avakian announced the removal of his office from 307 E. Regent to 125 W. Regent, Inglewood, California.

Maurice A. Bliss announced the removal of his office to 410 North San Mateo Dr., San Mateo, California.

Warren G. Brown announced the removal of his office from 2009 East Main St. to 2961 Loma Vista Rd., Ventura, California.

W. Robert Campbell announced the removal of his office to Medical Arts Building, Suite 7, 2420 North California St., Stockton, California.

Howard H. Jan announced the removal of his San Francisco offices to 2364 Geary Blvd., San Francisco, California. The Oakland offices will remain at 3451 Piedmont Ave.

Edward A. Kemler announced the removal of his office from 613 3rd Ave. to 230 "F" St., Suite A, Chula Vista, California.

J. Frederick Conrad announced the association of Maurice E. Masters, Allen-Williams Dental Group at 1963 Fourth Ave., San Diego, California.

Walter J. Straub announced the removal of his office to The El Cerrito-Camino Medical Building at No. 2 El Cerrito, San Mateo, California.

Southern Society of Orthodontists

The thirty-sixth annual meeting of the Southern Society of Orthodontists will be held at the Eden Rock Hotel, Miami Beach, Florida, Oct. 27 through Oct. 30, 1957. Reservations may be made by writing direct to the hotel.

Southwestern Society of Orthodontists

The next meeting of the Southwestern Society of Orthodontists will be held Sept. 29 through Oct. 2, 1957, at the Baker Hotel in Dallas, Texas.

American Institute of Dental Medicine

The next annual meeting of the Institute will take place at The Oasis Hotel, Palm Springs, California, Oct. 13 to 17, 1957. The faculty will consist of:

Dr. Edwin F. Alston, Clinical Instructor in Psychiatry at the University of California Medical School, who, because of the close relationship of many psychiatric and psychologic problems to dental practice, will present a series of lectures in this field.

Dr. S. J. Kreshover, Associate Director of the National Institute of Dental Research in charge of intramural dental research, will discuss selected subjects in the field of general and oral pathology.

Dr. K. F. Meyer, Director Emeritus of the Hooper Foundation for Medical Research, University of California, will discuss the exciting story of polio vaccine, as well as the advancement of scientific research in Russia.

Dr. Max S. Sadove, Professor of Surgery, University of Illinois, has been highly recommended for his expert knowledge in the field of anesthesiology. He will correlate the various aspects of this subject to the practice of dentistry.

Dr. Joseph F. Volker, Dean of the School of Dentistry of Alabama University, has agreed to speak about caries and fluoride and dental health.

There will also be presentations by three of the younger research workers in the Division of Oral Biology, School of Dentistry, University of California, who are actively engaged in clinical and laboratory investigations: Drs. Sol Silverman, Theodore Grant, and Howard Myers.

All Seminar lecturers will participate in an open forum, discussing the application of their subject to the practice of dentistry. Because of the mounting interest in this annual meeting of the Institute, early registration is requested.

The Institute also calls attention to the Case History Service which is furnishing dental medicine case histories with Kodachrome slides, medical history, laboratory findings, roentgenograms, and all data pertaining to each individual case.

Applications and full information concerning either the annual meeting or the Case History Service may be secured from the Executive Secretary, Miss Marion G. Lewis, 2240 Channing Way, Berkeley 4, California.

Oren A. Oliver Receives College Award

One of five recipients of the Thompson-Gibson-Hobbs Memorial Award for 1957, bestowed by Lynchburg College of Lynchburg, Virginia, was Dr. Oren A. Oliver, orthodontist of Nashville, Tennessee.

In the presentation of the citation, it was said of Dr. Oliver that he received his education at Lynchburg College and V. P. I., University Medical and Dental College, Richmond, Virginia, and Atlanta Medical School; his postgraduate work was done at Harvard University, Massachusetts General Hospital, Northwestern University, and the Dewey School of Orthodontics. Since 1917 he has specialized in the practice of orthodontics in Nashville.

Dr. Oliver has been active in state and local dental committees and societies in Tennessee and was president of the American Dental Association in 1941 and 1942. He has written a textbook and has been coeditor of several orthodontic journals. He has served in the Armed Forces as a first lieutenant in the Dental Corps and as a dental consultant, and in 1956 was recommissioned as a lieutenant colonel. In 1954 he was a professor emeritus at the Vanderbilt University School of Medicine.

Dr. Korkhaus Gives Refresher Course at University of California School of Dentistry

On his recent trip to the United States, Dr. Gustav Korkhaus of Bonn, Germany, presented a two-day refresher course at the University of California School of Dentistry (Nov. 17 and 18, 1956).

The material presented included discussions on etiology of malocclusions, diagnosis, and treatment using the functional appliance of Andresen.

The approach to treatment was somewhat different from the methods commonly used in this country. His basic philosophy of treatment includes "exploitation of the natural growth tendency" by use of removable appliances.

Among the anomalies found in the dentition, he described compression anomalies in which the arches are too narrow; stress deformities, as in open-bite cases where environmental factors are dominant; progenia or preocclusion (Class III problems); excess overbites; distoclusions without complicating overbite and compression; loss of teeth; and those conditions due partly to environment and partly to heredity.

In treatment of these conditions, he advocates the use of removable appliances because of the possibility of influencing growth by altering the position of teeth, alveolar bone, and arch. It is interesting to note that he showed some cases in which widening of the median suture of the palate is accomplished in order to obtain the maximum maxillary development.

In discussing the role of extraction in orthodontics, Dr. Korkhaus pointed out that in cases where extraction procedures were followed there was unfavorable alveolar growth, and that usually these cases exhibited closing of the bite.

The removable appliances demonstrated were designed to produce tooth and alveolar changes that would be indicated after careful case analysis. Predetermination of arch width was part of the diagnostic procedure and was accomplished by using a chart relating the width of the upper incisor teeth of the premolars and molars. The appliances themselves were designed so that tipping movements could be accomplished when indicated or so that a type of bodily movement could also be obtained.

Death of J. Mark Trach

Word has just been received of the death of Dr. J. Mark Trach of Wheeling, West Virginia. An obituary will be published at a later date.

American Dental Association

The ninety-eighth annual session of the American Dental Association will be held in Miami-Miami Beach, Florida, Nov. 4 to 7, 1957.

European Orthodontic Society

The next meeting of the European Orthodontic Society will take place Aug. 29 to Sept. 2, 1957, in Stockholm, Sweden. Interesting papers have already been announced by orthodontists from the United States, Israel, and all countries of Europe. Simultaneous translation will make comprehension of all conferences easy.

All inquiries may be addressed to the president of the European Orthodontic Society: Professeur E. Fernex, 1 place du Port, Geneve, Suisse.

Fédération Dentaire Internationale Twelfth International Dental Congress

The Twelfth International Dental Congress will be held at the Congress building of the E. U. R. in Rome, Italy, Sept. 7 to 14, 1957.

The scientific program consists of twenty-five reports and 150 co-reports covering all fields of dentistry, including anatomy and physiology, anesthesia and surgery, caries and protective therapy, periodontal diseases, radiology, prosthesis, dento-maxillo orthopedics, and social dentistry. Before Sept. 7, 1957, all reports will be published in English, with a summary in French, German, Italian, and Spanish, in the *International Dental Journal* and in Italian in the *Rivista Italiana di Stomatologia.* In their September and October issues both journals have already published the reports of J. P. Walsh (Otago, New Zealand), J. G. de Boer (Groningen, Netherlands), J. A. Salzmann (New York), C. G. Paffenbarger (Washington), H. H. Stones and F. A. Lawton (Liverpool), and E. Müller (Hamburg, Germany).

By means of simultaneous translations, Congress members will be enabled to hear the reports, co-reports, and discussions in the five official languages—English, French, German, Italian, and Spanish.

Notes of Interest

Albert J. Colle, D.D.S., M.S., announces the removal of his office to the Royal Bank Building at Snowden, 5292 Queen Mary Rd., Montreal, Quebec, practice limited to orthodontics.

Dr. Lowrie J. Porter announces the association of Dr. Brendan J. Boylan at 41 East 57th St., New York, New York, for the exclusive practice of orthodontics.

Richard A. Riedel, D.D.S., M.S.D., and Alton W. Moore, D.D.S., M.S., announce the new location of their offices for the practice of orthodontics at 1660 Medical and Dental Bldg., Seattle, Washington.

Dr. Edward I. Silver announces the association of his son, Dr. William E. Silver, in the exclusive practice of orthodontics at 80 Boylston St., Boston, Massachusetts. Dr. William E. Silver has recently returned from active military service in Japan, where he served as orthodontist for the Far East Air Force.

Walter J. Straub, D.D.S., M.S., announces the removal of his office to the El Cerrito-Camino Medical Building, No. 2 El Cerrito, San Mateo, California, practice limited to orthodontics.

Charles Weber Volckmer, D.D.S., 420 West Fourth St., Williamsport, Pennsylvania, announces the reopening of an office for the practice of orthodontics.

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Forthcoming meetings of the American Association of Orthodontists:
1958—Commodore Hotel, New York, New York, April 27 to May 1.
1959—Statler Hotel, Detroit, Michigan, May 4 to 7.

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